

Talking Numbers: Technical versus Fundamental Investment Recommendations

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Abstract:

There is an age-old debate between technicians and fundamental analysts, the leading schools of thought in investment management. We answer that debate via a comprehensive analysis of technical and fundamental investment recommendations broadcasted on the TV show “Talking Numbers.” In particular, we study 1,599 dual recommendations, where each recommendation features a fundamental and a technical forecast. The evidence shows that technicians possess superior skills in predicting individual stock returns up to a twelve-month horizon, while fundamental analysts exhibit weaker predictive ability. Beyond that, neither group is able to predict returns on market-wide indexes, equity sectors, bonds, or commodities.

Keywords: fundamental analysis; technical analysis; market efficiency; abnormal returns

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1. Introduction

The two main schools of thought in investment management are technical and fundamental analyses. To formulate expectations about future asset prices, technicians analyze the historical price movement and trading volume of an asset, while fundamental analysts consider market and firm level economic factors. While both approaches have their advocates and adversaries, academics and practitioners have not yet compared head-to-head the quality of forecasts delivered by the groups. Instead, as elaborated below, one strand of studies examines the skills of fundamental analysts in making earnings forecasts, price targets, and investment recommendations, while the other strand, quite independently, assesses the performance of technical investment rules. This study attempts to answer the age-old debate between fundamental and technical analyses through a comprehensive analysis of the two investment paradigms.

To pursue the task, we employ a novel database from the TV show “Talking Numbers.” Hosted by CNBC and Yahoo Finance, this show features simultaneous dual recommendations on single stocks, indexes, Treasuries, and commodities, where each dual recommendation contains a fundamental and a technical forecast on the same asset and over a similar investment period. The unique setup of the show establishes an ideal laboratory for understanding the value of economic forecasts. In the first place, as both technicians and fundamental analysts are exposed to the same public information during the broadcast, their recommendations reveal the extent to which they possess private information and effectively process the flow of public information.

Notably, the show participants are well positioned. The typical analyst has at least twenty years of experience, a position as a managing director or chief officer, and nominations in ranking tables for best analysts, portfolio managers, or technicians. Such high-profile analysts

are less prone to experience and reputation concerns (Graham, 1999; Sorescu and Subrahmanyam, 2006), career concerns (Hong et al. 2000; Clement and Tse, 2005), and conflict of interest (Fang and Yasuda, 2009). Our head-to-head confrontation is also robust to data-mining. To our knowledge, we are the first to visit the “Talking Numbers” forecasts and the first to directly examine the performance of technical recommendations as the vast literature on technical analysis has assessed the value of publicized technical rules. Thus, we consider the possibility that technicians use propriety investment rules and/or properly time the existing publicized rules.

We study 1599 dual recommendations (1000 recommendations for 262 individual stocks and 599 for other assets) featuring prominent stocks (e.g., Apple, Google, Facebook, Exxon Mobil, Microsoft, Boeing), the most liquid commodities (e.g., gold, oil), the major bonds (e.g., the U.S. ten-year notes), and the major equity indexes (e.g., the various Dow Jones and Nasdaq indexes, and the energy, real estate, and pharmaceutical sectors). Thus, our findings are robust to liquidity concerns (e.g., Pástor and Stambaugh, 2003) covering the vast majority of investable asset classes.

Technical and fundamental approaches are tightly associated with the extensively studied market anomalies.¹ Prominent findings in the field are that the profitability of market anomalies comes from the short leg of the trade (Stambaugh, Yu, and Yuan, 2012; Avramov, Chordia, Jostova, and Philipov, 2013; Drechsler and Drechsler, 2014) and that anomalies attenuate following their discovery (Schwert 2003; Chordia, Subrahmanyam, and Tong, 2014; McLean and Pontiff, 2016). Our dual recommendations pertain to the “out-of-sample” period spanning

¹ To name a few, anomalies related to past returns (Jegadeesh, 1990, Lehman, 1990, Jegadeesh and Titman, 1993), trading volume, and volatility (e.g., Haugen and Baker, 1996) are associated with technical signals, while the accruals (Sloan, 1996), credit risk (Dichev, 1998; Campbell, Hilscher, and Szilagyi, 2008; Avramov, Chordia, Jostova, and Philipov, 2009), value (Fama and French, 1992), and earnings momentum (Ball and Brown, 1968) are based on firm fundamentals.

Nov 8, 2011 through Dec 31, 2014, or the period that follows the publication of anomalies in academic journals. Thus, if any investment approach is able to generate abnormal returns, especially in the long-leg of the trade, it essentially implements toolkits that go beyond the vast collection of market anomalies.

Figure 1 highlights the major findings for technical and fundamental individual stock recommendations during the sample period. The upper panel plots the average cumulative returns adjusted to the Fama–French (1993) and momentum benchmarks (CARs) of buy and sell technical and buy and sell fundamental recommendations, while the lower panel plots the return spreads considering buy-minus-sell technical and fundamental portfolios. In both panels, buy (sell) corresponds to both buy and strong-buy (sell and strong-sell) recommendations. In these portfolios, stocks are held for a twelve-month period from the recommendation broadcast at equal proportions. To be on the conservative side, we record abnormal returns (Panel A) and investment payoffs (Panel B) using the closing price of the day of recommendation.

Overall, the evidence shows that technicians display superior stock-picking skills, recommending, on average, the purchase of undervalued stocks along with the sale of overvalued stocks. Fundamental analysts exhibit weaker forecasting power. To illustrate, observe from Panel A that six months following the recommendation broadcast, the CAR on technical buy and strong-buy recommended stocks peaks at a value of 4.1%. Following nine months the CAR on technical sell and strong-sell recommended stocks troughs at -2.8% (97.2% of the initial endowment). The corresponding figures for fundamental buy and sell recommendations are both near 1%. The differences between buy and sell technical recommendations are statistically significant for all examined horizons that range between one and twelve months, whereas the

differences between buy and sell fundamental recommendations are, for the most part, insignificant.

From a real time investment perspective, Panel B depicts calendar-time portfolios (constructed similarly to Mitchell and Stafford (2000)). The evidence shows that the return spread corresponding to the buy-minus-sell technical portfolio is positive and it increases over the entire sample period reaching 41.3% in December 2014. The buy-minus-sell fundamental portfolio establishes payoffs that rotate around zero during most of the sample period. The overall difference between technical and fundamental spreads is economically and statistically significant at 26.9%. Moreover, the buy-minus-sell technical portfolio yields significant Jensen-Alpha of 0.136 ($t = 2.13$) which even increases to 0.44 ($t = 3.16$) when considering only strong buy and strong sell recommendations. Strikingly, the breakeven transaction costs that would wipe out the abnormal performance are at 2.1% for all buy and all sell technical recommendations and 6.3% for strong buy and strong sell technical recommendations. Our findings suggest that technicians provide investment recommendations that are profitable and implementable in real time.

[Please insert Figure 1 here]

Altogether, it is evident that technical recommendations add value in predicting upward and downward stock price movements. As implied earlier, the ability to forecast abnormal up movements indicates that technicians use investment toolkits that go beyond the comprehensive collection of publicized anomalies. Forecasting abnormal down movements also stands out in the presence of the positive trend characterizing the markets during the sample period.

The success of technicians in picking individual stocks is robust to controlling for common risk factors as well as firm-level size, book-to-market, volatility, trading volume, past

trends in stock prices, seasonality in stock returns, consensus forecasts, as reflected through analysts' recommendations from Institutional Brokers' Estimate System (I/B/E/S), corporate insiders' trading activity, and institutional holdings. It is also unaffected by the immediate impact of the broadcast on the stock price, which is found to be highly significant.

Examining the traits of technicians and fundamental analysts does not reveal any particular pattern that works on behalf of the technicians. In particular, analysts belonging to both groups serve as the heads of research or the investment division of prominent banks, investment management funds, and research companies, such as Deutsche Bank, Piper Jaffray, Stifel Financial Corp, and Standard & Poor's Investment Advisory Services. Notably, 100% of the participants are "senior" analysts with more than ten years of experience (95% with more than 20 years), while 74% of the fundamental analysts and 91% of the technicians have an additional title of managing director, chief officer, or head of department. Also, 13% of the fundamental analysts and 15% of the technicians are from the buy-side industry, actively managing wealth. Of the fundamental analysts, 13% are founders of their own business while the corresponding figure for technicians is 21%. In terms of education, 53% of the fundamental analysts and 26% of the technicians hold a graduate degree (mainly MBA or MA in economics). Furthermore, 40% of the fundamental analysts and 15% of the technicians graduated from "Top-twenty" U.S. universities. Interestingly, the correlation between the fundamental and technical stock recommendations is practically zero. The overall evidence thus suggests that the documented outperformance of technicians emerges from the investment toolkits applied rather than the unique traits of the participating analysts.

We demonstrate that the inability of fundamental analysts to predict future stock returns is uniform across various industries (excluding services) and across all the equity styles

considered, namely size, book-to-market, past return, and volatility. In contrast, technical recommendations produce robust predictions for all subsamples explored, which are grouped according to industries (excluding mining), size, book-to-market, past return, and volatility. The inability to predict returns on mining stocks mirrors the inability of both groups to predict future commodity prices. In fact, both groups have uniformly failed to predict returns on all the broader asset classes examined, for example Treasuries, market indexes, and equity sector indexes.

Indeed, common wisdom suggests that the abilities to process public information effectively or extract private signals from prices and volume mostly characterize individual stocks. For instance, in his bestseller on technical trading *The New Trading for Living*, Elder (2014) points out (page 36) that “Charts reflect all trades by all market participants – including insiders. ... Technical analysis can help you detect insider buying and selling.” Of course, such insider trading pertains to individual stocks only, consistent with the abilities of technicians to predict individual stock returns. In contrast, investable patterns in broad market indexes that stand out are likely to attract immediately capital flows and thus are traded away.

To the best of our knowledge, we are the first to confront head-to-head fundamental analysts and technicians. Our setup is unique in that both groups are exposed to the same public information, simultaneous recommendations are made by well-positioned analysts and for similar investment horizons, and the collection of investable assets is comprehensive. Technicians outperform as they depart from market consensus and are able to detect buying and selling insider trading. These observations are supported by our findings that while fundamental recommendations are in-line with market consensus, technical recommendations are not associated with market consensus but are rather correlated with public trading activity of corporate insiders. Moreover, based on viewing each of the “Talking Numbers” broadcasts at

least twice, we note that while technicians typically employ standard rules they have been able to properly time those rules and thereby add value in forecasting stock returns.

Three strands of studies are related to our work. The first investigates the value of fundamental analysis. Stickel (1992) and Womack (1996) document value in revisions of consensus recommendations, while Barber et al. (2001) report the disappearance of that value in the presence of transaction costs. Likewise, Jaffe and Mahoney (1999) and Metrick (1999) exhibit the lack of forecasting value in investment newsletters. Here, we show that even considering well positioned analysts, the fundamental approach does not provide a significant investment value.

The second strand analyzes technical rules. Brock et al. (1992) find that technical rules predict returns on stock indexes. However, such predictability vanishes in the presence of transaction costs, per Bessembinder and Chan (1998). Allen and Karjalainen (1999) and Sullivan et al. (1999) do not find substantial value in technical rules, while Lo et al. (2000) show that technical patterns predict stock returns. Zhu and Zhou (2009) show that combining the moving average with other technical signals improves asset allocations, while Han et al. (2013) report profitability based on moving averages. Here, we assess the value of technical recommendations, rather than publicized technical rules, and confront them head-to-head with fundamental ones.

The third strand examines the immediate impact of media-publicized recommendations. Liu et al. (1990), Barber and Loeffler (1993), and Mathur and Waheed (1995) document abnormal returns shortly after the publication of recommendations in the newspaper, and Hirschey et al. (2000) report abnormal returns on the day after the recommendations are posted on the Internet. However, Dewally (2003) detects no market reaction to recommendations posted by a newsgroup on the Internet. Neumann and Peppi (2007) find that the recommendations made

by Jim Cramer, the host of the CNBC “Mad Money” program, are followed by abnormal payoffs during the following day, and Busse and Green (2002) find that recommendations broadcasted on the CNBC “Morning Call” and “Midday Call” programs produce abnormal immediate profits within 15 seconds. Relative to these studies, we examine the long-term value, rather than the immediate impact, of recommendations. Eventually, technical stock recommendations provide value not only for immediate trading but also up to a year following their broadcast.

The remainder of the paper proceeds as follows. Section 2 provides descriptive statistics of recommendations from “Talking Numbers” and analyses the factors underlying the recommendations. Section 3 reports the empirical findings corresponding to individual stocks. Section 4 extends the analysis to the other asset classes noted earlier. Section 5 concludes. A list of the assets covered in the show, the methodology used to convert the content of the show into ultimate investment recommendations, and the data used in the empirical experiments are detailed in the appendices.

2. The investment recommendations

Our dual recommendations are extracted from the TV show “Talking Numbers.” According to Yahoo, the broadcast “takes a 360° approach to trading – highlighting the best investment opportunities by analyzing stocks both a technical and a fundamental point of view...”

The sample spans November 8, 2011 through December 31, 2014. November 8, 2011 featured the first comparison between technical and fundamental points of view. Beforehand, “Talking Numbers” was a rather different show. It was part of the CNBC broadcast “Closing Bell” and usually featured the view of a single analyst, who mainly discussed the S&P 500

index. In April 2015, the original program was discontinued, and CNBC initiated a new broadcast titled “Trading Nation.” This new show exhibits several similarities to “Talking Numbers,” including the same host. In addition, several analysts who participated in “Talking Numbers” also take part in “Trading Nation.” However, the format of “Trading Nation” does not formally confront technical and fundamental points of view.

In the first year of the sample, “Talking Numbers” was broadcasted once per trading day, typically featuring four recommendations or two dual recommendations: two distinct assets, each of which is covered by both technicians and fundamental analysts. Then, the program was usually broadcasted several times daily, in most cases each program covering a single asset. In a few cases, the program features only one analyst delivering either a technical or a fundamental point of view, without a comparison. Such single recommendations are excluded from the primary analysis and are later considered when examining the robustness of the results.

Fundamental analysis typically starts with a macroeconomic outlook followed by a recommendation along with supporting discussions. A technician describes a chart of historical prices and then discusses the main technical characteristics underlying the recommendation. Often, there are more supporting charts and even a discussion linking the technical recommendation to fundamental factors. It is common for the technician, the fundamental analyst, and the show hosts to debate the recommendations. Throughout the show, the recommendations are referred as “investment” recommendations corresponding to periods that range from one month to “few months.” Rarely, the analysts also mention a separate recommendation for a time horizon of one day or a few days, usually referred to as a “trading” recommendation, or a long-term forecast for horizons longer than one year. Such

recommendations are exceptional items and are provided along with the recommendation for the main investment horizon as well as by only a single analyst. Thus, they are excluded.

We classify technical and fundamental recommendations into five conventional categories, namely “strong buy,” “buy,” “hold,” “sell”, and “strong sell.” In about 20%–30% of the cases (depending on the asset class), the analyst’s formal rating is explicitly stated verbally or in a caption. Then, the classification clearly adhered to the analysts’ explicit ratings. Otherwise, if the recommendation is not explicit, we systematically extract the recommendation category based on the content of the show, as explained and demonstrated in Appendix A. While the differences between strong-buy and buy and between strong-sell and sell recommendations could be subtle, the distinctions between buy and sell groups are clear and well defined. It is unlikely that a positive recommendation would be classified as a sell or a negative recommendation classified as a buy. Notably, the main results are qualitatively similar whether we employ the five-category scale, a three-category scale (all buy, hold and all sell), or a two-category scale (all buy and all sell, excluding hold). The latter is less exposed to classification concerns.

Table 1 summarizes the descriptive statistics of the broad set of recommendations for single stocks, the market index, particular equity sectors, bonds, and commodities. Appendix B presents the full list of all the individual stocks featured in “Talking Numbers” as well as all the other assets. Altogether, we are able to capture 1599 dual recommendations. There are 1,000 technical recommendations and 1,000 fundamental recommendations (1,000 dual recommendations) featuring 262 individual stocks. There are 149 dual recommendations covering the S&P 500 index (the NYSE composite index in one case); 256 dual recommendations corresponding to 58 indexes and ETFs, such as the NASDAQ 100, the Dow Jones Industrial/Utilities/Transportation and particular sectors including banking, retail,

homebuilders, miners, and biotechnology, as well as non-U.S. markets including emerging markets, frontier markets, and the Nikkei 225; 50 dual recommendations featuring bond yields (mostly 10-year Treasuries but also municipal bonds); and 144 dual recommendations about 17 commodities (especially gold and crude oil). In 370 shows, a single recommendation records no corresponding comparison, because either only one analyst participated in the show or one of the analysts did not ultimately discuss the relevant asset. As noted in the previous section, such recommendations are excluded from the main analysis but are later considered in the robustness tests. A total of 49 observations are excluded because the underlying asset is unique (e.g., Bitcoin, VIX, luxury houses) with only a few observations.

[Please insert Table 1 here]

Observe from Table 1 that while the number of technicians and fundamental analysts is quite similar among the general asset classes, it is markedly distinct among single stocks. There are 34 technicians versus 159 fundamental analysts. Also notable is the relatively small number of fundamental and technical female analysts – about 10% across all the various asset classes. While among the asset classes the recommendations span all 5 categories, there are substantially more buy and sell recommendations than strong-buy, strong-sell, and hold recommendations.

The Spearman rank correlation coefficient, which measures the correlation with the numbers from 1 to 5 (e.g., 1 stands for strong sell) corresponding to the fundamental and technical recommendations, is typically small. It is 0.05 for single stocks, 0.18 for the market index, 0.21 for equity sectors and non-U.S. indexes, 0.29 for bonds, and 0.38 for commodities. As the core of our analysis pertains to individual stocks, it is evident that technical and fundamental recommendations are not mutually related either positively or negatively.

We further explore the determinants of the fundamental versus technical stock recommendations. In Table 2 we report the results of the ordered probit regression

$$REC_i = \gamma_0 + \sum_{j=1}^4 \gamma_{1j} FIRM_i^j + \sum_{j=1}^5 \gamma_{2j} R_i^j + \sum_{j=1}^3 \gamma_{3j} TREND_i^j + \sum_{j=1}^5 \gamma_{4j} CONSENSUS_i^j + \varepsilon_i, \quad (1)$$

where i is the stock-specific subscript and REC describes the fundamental or technical recommendation category (1 – strong sell, 5 – strong buy). According to Womack (1996) and Jegadeesh et al. (2004), among others, the performance of analysts' recommendations depends on the firm type. In response, we consider four firm level variables ($FIRM$) including the previous-year log of market capitalization, the book-to-market ratio if the previous-year book value is positive and zero otherwise, volatility over the year prior to the recommendation broadcast, and the log of the average daily trading volume over the year prior to the recommendation broadcast.

The past return variables (R) include the returns during the past six months and three years, attempting to capture momentum and long-term reversal effects (De Bondt and Thaler, 1985; Jegadeesh and Titman, 1993), and the seasonal returns in the same calendar month over one, two, and three years prior to the recommendation broadcast per Heston and Sadka (2008). Three short-term $TREND$ variables are considered. The first is the past one-month return to control for reversal effects per Jegadeesh (1990). The other two variables are changes in volatility and trading volume during the month prior to the recommendation broadcast relative to the previous-year figures.

We consider five $CONSENSUS$ variables to examine the association between the recommendations and the consensus among analysts, corporate insiders, and institutional investors. Specifically, the first variable is the percentage surprise in earnings per share (EPS) during the past quarter. The next two variables measure the mean and standard deviation of

analysts' recommendations (1 – strong sell, 5 – strong buy) standing for market consensus and its dispersion, respectively. The last two variables are the corporate insider public trading index which is a proxy for the consensus among corporate insiders, and the percentage of institutional ownership of the company stocks, which is a proxy for the consensus among institutions. Considering institutional investors could mitigate the possibility that the investment recommendations are different due to price biases attributable to institutional trades (Gompers and Metrick, 2011; Basak and Pavlova, 2013). The corporate insider public trading index is defined as purchases less sales of corporate insiders divided by their total trades in the previous quarter.

[Please insert Table 2 here]

For both fundamental and technical recommendations, we estimate Regression (1) considering three scenarios pertaining to the recommendation types including all the five categories, the four categories (buy, strong buy, sell, and strong sell), and the two categories (all buy versus all sell). The dependent variable in Test 1 (2) in Table 2 is the fundamental (technical) recommendation. Starting from Test 1a (five recommendation categories), the volatility coefficient is negative and significant and the volume and analysts' mean recommendation are positive and significant. Thus, fundamental recommendations are in line with analysts' consensus and moreover they are more tilted toward buy when there is higher trading volume accompanied by lower volatility. The results are similar in Tests 1b and 1c, corresponding to the four and two recommendation categories, respectively. In Test 1c analysts' dispersion is negatively significant which is also in line with the notion that fundamental recommendations are positively correlated with analysts' consensus. Notice that the results reported here need not imply that fundamental recommendations are essentially subject to

herding as the positive relation between such recommendations and consensus forecasts could be attributable to the utilization of similar toolkits.

Different economic factors underlie technical recommendations. Focusing on Test 2a (all five recommendation categories), the coefficients corresponding to past one- and six-month returns and insiders' trading are positive and significant. The results are similar albeit less significant in Tests 2b and 2c with four and two recommendation categories, respectively. Thus, while fundamental recommendations are especially associated with market consensus, technical recommendations are correlated with recent past returns and trading activity of corporate insiders. These results are consistent with the view that the fundamental analysts and technicians employ very distinct investment toolkits, each of which is associated with a unique set of economic forces.

3. Individual stocks: the empirical evidence

This section focuses exclusively on single-stock recommendations. Investment recommendations featuring the other asset classes will be analyzed in the next section. Figure 2 depicts the average stock returns for the five recommendation categories. We consider investment horizons of one, three, six, nine, and twelve months following the broadcasts. To be on the conservative side, here as well as in all the follow-up analyses, investment returns start accumulating based on the recommendation day's closing price. The left (right) figures pertain to fundamental (technical) recommendations. The top figures exhibit raw average returns, while the bottom figures display returns adjusted for the three Fama–French and momentum factors, i.e. the raw returns less fitted returns based on the four factor model.

Consistent with the findings reported in the introduction, it is evident from Figure 2 that the fundamental analysts do not deliver meaningful enough forecasts of future stock returns. The mean raw returns during one, six, nine, and twelve months following sell recommendations are actually higher than the mean returns following buy recommendations. To wit, for the twelve-month horizon, the mean returns associated with sell and buy recommendations are 23.4% and 20.3%, respectively. The corresponding risk-adjusted figures are 2.4% and 1.9%. In contrast, technicians reveal a rather strong return–recommendation relation. Focusing on the six-month horizon, the average returns are 3.6% (strong sell), 7.2% (sell), 11.8% (hold), 10.9% (buy), and 16.8% (strong buy). The risk-adjusted figures are –5.3% (strong sell), –1.7% (sell), 2.2% (hold), 1.7% (buy), and 5.3% (strong buy).

[Please insert Figure 2 here]

Table 3 reports the relation between the investment average return, the recommendation category, and the investment horizon in more detail. Reported are the average returns for the five recommendation types. Moreover, as the classification for “all-buy” (buy and strong-buy recommendations) and “all-sell” recommendations (sell and strong-sell recommendations) is fairly unambiguous, we also report the returns corresponding to such “all” categories.

Starting with fundamental analysts, sell recommendations are followed by higher average returns than buy recommendations for the one-, six- and nine-month horizons. For instance, for the nine-month horizon, sell (buy) recommendations record an 18.3% (13.7%) average return. A comparison of the strong-buy and strong-sell fundamental recommendations reveals a more appealing outlook. The return spreads between the two extreme categories are $2.6\% - 1.3\% = 1.3\%$, 5.0%, 7.8%, 10.4%, and 17.9% for the five investment horizons. Nevertheless, notice that the return spreads between the all-buy and all-sell fundamental recommendations are relatively

small, given by 0.1%, 1.4%, 0.3%, -1.2% and 1.3%, respectively. Likewise, for the all-sell and all-buy fundamental recommendations, excluding one case of twelve-month risk-adjusted returns, the Mann–Whitney test reveals that the return distributions are indistinguishable, suggesting that the fundamental analysis is comparable with random draws of recommendations.

In contrast, the technicians reveal quite impressive stock-picking skills. Their buy recommendations predict uniformly higher average returns, both raw and risk-adjusted, than their sell recommendations. For instance, for the nine-month horizon, buy and sell recommendations are associated with a 16.5% and 13.9% average raw return, respectively. The corresponding risk-adjusted figures are 2.2% and -0.6. Further, the return spreads between all-buy and all-sell recommendations are equal to 1.9%, 2.4%, 6.2%, 5.8%, and 6.4% for the five horizons considered. Similar evidence emerges on the basis of risk-adjusted returns. The investment returns following all-buy recommendations are uniformly larger than those following all-sell recommendations. For example, the corresponding nine-month returns are -1.2% for all-sell and 3.8% for all-buy. The superiority of technicians over fundamental analysts appears in all five investment horizons. In all cases, the average returns corresponding to technical all-sell recommendations are lower than the fundamental all-sell recommendations and the average returns corresponding to technical all-buy recommendations are higher than the fundamental all-buy recommendations.

All the statistical tests pertaining to the technical recommendations are highly significant, indicating that the success of the technicians is not random. Specifically, among the technical recommendations, the Kruskal–Wallis statistic (which is a non-parametric test for the equality of the mean return distributions across all five recommendation categories) significantly rejects the null hypothesis of equal mean returns for the various categories of recommendations apart from

one case (three-month period). Similarly, the Mann–Whitney statistic, which is a non-parametric test for the equality of all-buy and all-sell distributions, strongly rejects the null hypothesis, implying that the distribution of returns realized following all-buy recommendations is significantly different (shifted to the right) from that of all-sell recommendations.

[Please insert Table 3 here]

In unreported tests we find that the advantage of technical recommendations is apparent in two dimensions: the number of correct recommendations and the quality of recommendations manifested through gains and losses. Technicians generate a higher proportion of correct recommendations, whereby a correct recommendation amounts to a buy (sell) recommendation followed by an advancing (diminishing) stock price. Their recommendations also produce higher gains following correct recommendations and lower losses following incorrect recommendations.

3.1 Cross-section analysis

Regression analysis is essential for further studying the quality of recommendations. In the context of analysts' recommendations, it has been shown that the firm size (Womack, 1996), past return, volume, book-to-market ratio (Jegadeesh et al. 2004), and industry affiliation (Boni and Womack, 2006) are associated with the performance of recommendations. Moreover, we show above that fundamental recommendations are associated with analysts' consensus while technical recommendations are associated with momentum and corporate insider trading. In response, we run the following cross-section regression

$$\begin{aligned}
R_i = & \gamma_0 + \gamma_1 REC_i + \sum_{j=1}^4 \gamma_{2j} FIRM_i^j + \sum_{j=1}^5 \gamma_{3j} R_i^j + \sum_{j=1}^3 \gamma_{4j} TREND_i^j + \sum_{j=1}^5 \gamma_{5j} CONSENSUS_i^j + \\
& + \sum_{j=1}^2 \gamma_{6j} RECIMP_i^j + \varepsilon_i,
\end{aligned} \tag{2}$$

where i is the stock-specific subscript, R is the stock return over alternative periods, and REC describes the fundamental or technical recommendation category (1 – strong sell, 5 – strong buy). The first four groups of control variables are identical to those variables considered in Equation (1). The $FIRM$ variables are market capitalization, book-to-market ratio, volatility, and average daily trading volume. The past return variables (R) are the returns during six months and three years, and the seasonal returns over the same calendar month during one, two, and three years prior to the recommendation broadcast. The short-term $TREND$ variables are one-month return and changes in volatility and volume during the month prior to the recommendation broadcast relative to the previous-year figures. The five $CONSENSUS$ variables are past quarter percentage surprise in EPS, mean and standard deviation of analysts' recommendations, corporate insider trading index and the percentage of institutional ownership. Equation (2) includes also two recommendation broadcast's impact control variables ($RECIMP$): the return and change in volume over two days following the recommendation broadcast, intended to control for any immediate impact of recommendations.

Table 4 reports the regression evidence. We perform twenty distinct tests. The dependent variable in most of the tests (unless otherwise noted) is the six-month return following the broadcast. Test 1 excludes all the control variables. Here, consistent with the previous analyses, the fundamental recommendations' (REC) coefficient is insignificant, while its technical counterpart is significantly positive ($t = 6.82$).

Tests 2 controls for size, book-to-market, volatility, and volume. The evidence supporting technical recommendations stands out. Notice that our sample consists of large firms mostly belonging to the upper-size decile, with average market capitalization of 39 billion dollars, and medium book-to-market firms belonging to the low–mid book-to-market deciles (see Appendix B for the list of stocks). Thus, it may not be surprising that our sample of stocks does not exhibit effects related to size, volatility, or book-to-market ratio. Indeed, most of the additional control variables are insignificant.

[Please insert Table 4 here]

Test 3 considers the past returns over one-month, six-month, and three-year periods, the seasonality in returns, and the change in volume and volatility in the last month relative to the past year. In line with the evidence on momentum and reversal, the past six-month return coefficient is positive and significant and the three-year return coefficient is negative and significant; still, the technical recommendation coefficient is significantly positive ($t = 5.97$). The fundamental recommendations do not display economic or statistical significance. Thus, momentum and reversal do not capture the ability of technicians to predict abnormal future returns.

Test 4 controls for market consensus variables. In both tests the standard deviation of analysts' recommendations and insider trading index enter significantly and positively so. Nevertheless, the technical recommendation coefficient is still significantly positive ($t = 4.61$) whereas the fundamental recommendation coefficient is insignificant.

Test 5 combines all control variables while also controlling for the impact of the broadcast itself. The technical recommendations remain significant suggesting that past stock return and market consensus variables do not capture the predictive power of technical

recommendations. The return–recommendation relation is also not attributable to the direct short-term impact of the broadcasts on the stock prices and trading volume, even when the coefficients corresponding to these two variables are significant. While there is a significant immediate impact of the recommendations on the stock price and trading volume, the predictive ability of technical recommendations persists long afterwards.

Tests 6 and 7 mirror Tests 1 and 5, respectively, except that the dependent variable is the six-month return adjusted to the Fama–French and momentum factors. Evidently, the predictive ability of technical recommendations is unexplained by common risk factors that could simultaneously affect the stock prices and the recommendation category.

Kumar (2010) shows that female analysts display a superior forecast ability due to the self-selection process. Presumably, those females who have superb abilities as analysts pursue a career in a male-dominated industry. Our sample contains about 90% male analysts among the fundamentalists and technicians across all the asset classes (see Table 1). Thus, gender does not seem to represent a potential source of systematic bias.

Nevertheless, Test 8 implements a formal test accounting for analyst gender. The fundamental recommendations' coefficients are near zero and insignificant regardless of the analyst's gender. The technical recommendations' coefficients are larger and highly significant ($t = 5.34$ for males and 2.84 for females). While the coefficient corresponding to female analysts is slightly larger (0.027 versus 0.025), the gender effects are altogether insignificant. Namely, the success of technical recommendations in predicting returns on individual stocks is not captured by the analyst's gender effect. Moreover, female technicians or fundamental analysts do not outperform their male counterparts.

Tests 9 and 10 compare recommendations conditional on undergraduate versus graduate analysts and analysts from “Top 20” U.S. universities versus other analysts. In both tests the fundamental recommendations’ coefficients are near zero and the technical recommendations’ coefficients are larger and highly significant.

Test 11 compares the buy-side and sell-side analysts. While the fundamental recommendations’ coefficients remain close to zero and insignificant the technical recommendations’ coefficients are, once again, highly significant ($t = 5.18$ for sell-side analysts and 5.95 for buy-side analysts). Moreover, the buy-side analysts’ coefficient (0.041) is almost twice as large as that of sell-side coefficient (0.025) and the difference is significant ($p < 0.01$). Thus, both sell-side and buy-side technicians are successful in predicting stock returns.

While the dependent variable in Tests 1 through 11 is the stock return (raw or risk-adjusted) over six months following the recommendation broadcast, we also examine one-, three-, nine- and twelve-month investment returns following the broadcasts. Tests 12 through 15 report the empirical evidence. For all the investment horizons, the fundamental recommendation coefficients are indistinguishable from zero, while their technical counterparts are positively significant.

The remainder tests in Table 4 display the robustness of the results focusing on the six-month returns. Test 16 excludes the hold category to avoid potential misclassification errors. Indeed, the difference between buy and sell recommendations is distinctive from the difference between hold and buy or hold and sell recommendations. Similarly, the difference between buy and sell recommendations is distinctive from the difference between buy and strong-buy and between sell and strong-sell recommendations.

Test 17 focuses on the all-buy and all-sell categories. The evidence again shows that the fundamental recommendations are insignificant, while the technical recommendations are highly significant ($t = 6.14$ and $t = 4.15$, respectively). That is, the results are robust to possible classification errors. They persist when the hold category and the distinctions between strong-buy and buy and between strong-sell and sell are excluded.

Tests 18 and 19 examine the sensitivity of the results to the presence of outliers. The dependent variable in Test 18 is the six-month return winsorised at 2.5%. In Test 19, we employ the quantile regression around the median ($\tau = 0.5$), which is less sensitive to extreme observations than the OLS regression. In both cases, the technical recommendations are highly significant ($t = 5.58$ and $t = 3.52$, respectively), suggesting that the stock-picking skills of technical analysts are not attributable to outliers.

Finally, a few programs feature a single, either fundamental or technical, recommendation with no comparison. While all the reported tests exclude such programs, Test 20 accounts for single-recommendation shows. The overall evidence remains unchanged.

To summarize, the cross-section regressions confirm the strong predictive ability of technical recommendations, as demonstrated in Figure 1. That predictive ability is uncaptured by the firm's size, book-to-market, volatility, volume, and past stock trends, as well as by common risk factors, the analyst's gender and education, the market consensus, and the apparent direct impact of recommendation broadcasts on stock prices. Both sell-side and buy-side analysts exhibit robust predictive ability which seems to be more profound in the latter group. The results are also robust to the presence of outliers as well as potential classification errors. Fundamental recommendations, in contrast, do not exhibit a clear and consistent relation with the subsequent returns.

3.2 Examining industry and style effects

Boni and Womack (2006) argue that the economic value of financial analysts relates to their status as industry specialists. To explore the potential effects of industry affiliation and firm attributes on recommendations, we run the following cross-section regression:

$$R_i = \gamma_0 + \sum_j \gamma_{1j}(REC_i)(FIRM_{ij}) + \varepsilon_i, \quad (3)$$

where R_i is the six-month stock return (we consider both raw and risk-adjusted returns) and REC_i describes the recommendation category (1 – strong sell, 5 – strong buy). We consider two specifications. In one, $FIRM_{ij}$ ($j = 1, 2, \dots, 6$) are dummies for six industries: mining, construction and manufacturing, utilities, trade, financial and administration, and services. The industry division is made according to the Standard Industrial Classification (SIC) code with the exception that the construction and the wholesale trade and administration sectors, for which we record fewer than ten observations, are merged with their closest-matching industries. In the second specification, $FIRM_{ij}$ ($j = 1, 2, 3$) are dummies for firms belonging to the bottom 30%, core 40%, and top 30% of either firm's size, book-to-market ratio, volatility, or past return.

[Please insert Table 5 here]

Table 5 reports the results. Starting with the fundamental analysis, the recommendations do predict the future returns in the services industry. The mining coefficient is negatively significant, while all the other recommendation coefficients are generally insignificant. Moving to the technical front, excluding the mining industry, the analyst recommendations produce robust predictions based on the raw and risk-adjusted returns. The failure to predict the mining stock returns is consistent with the prominent inability of both technicians and fundamental analysts to predict commodity prices, as we show below.

Panel B of Table 5 reports the impact of firm characteristics on recommendations. As the sample is dominated by large firms, we attribute the 19 firms belonging to the bottom group to the core group. The coefficients corresponding to the size, book-to-market ratio, volatility, and past return groups of the fundamental recommendations are, for the most part, insignificant. This is consistent with the notion that fundamental recommendations display low power in predicting future returns across all the equity styles. In contrast, all the coefficients corresponding to the technical recommendations are highly significantly positive.

3.3 Abnormal performance and break-even transaction costs

We construct two zero-cost buy-minus-sell portfolios corresponding to fundamental and technical recommendations. We assume that trading occurs at the closing price of the day of recommendation and it lasts for 12 months. All buy and sell recommended stocks are equally weighted and the amount invested in buy recommended stocks is equal to the amount of shorts in sell recommended stocks. The evidence shows that a \$1 position in the technical buy-minus-sell portfolio at the beginning of studied period (November 2011) yields positive profitability for the entire period which tends to increase over time reaching \$0.36 in March 2015 with breakeven transaction costs of 2.1% per recommendation. Indeed, regressing portfolio excess returns on the market factor yields a positively significant Jensen-Alpha of 0.136 ($t = 2.13$) for the technical portfolio and -0.023 ($t = -0.37$) for the fundamental portfolio. The Jensen-Alpha is 0.096 and significant ($t = 1.99$) if investment starts one month later when there are at least 10 recommendations at any investment period. Focusing on the strong buy and strong sell technical recommendations, an initial zero cost position investing \$1 long and \$1 short yields \$2.30 in March 2015 with breakeven transaction costs of 6.3% per recommendation. Overall our findings

show that technical recommendations establish sizeable and implementable investment rules at both the long and short legs of the trade.

4. Examining recommendations among broader asset classes

Why are technical recommendations successful in predicting returns on individual stocks? One possibility is that technicians trade on private signals, as prescribed by Blume et al. (1994), and Zhu and Zhou (2009). Also, the results of Table 2 that technical recommendations are positively correlated with public trading activity of corporate insiders is consistent with the notion that technicians can infer insider buying and selling activities from the charts. In either case, the essential hypothesis is that the success of technicians in predicting individual stock returns does not translate into robust predictions of broader asset returns.

The empirical evidence provides support for that hypothesis. In particular, Figure 3 presents the average returns on various asset classes for each school of thought. The left (right) plots feature fundamental (technical) recommendations. The asset classes include the S&P 500 index (Figure 3a), equity sectors and non-U.S. equity indexes (Figure 3b), U.S. bonds (Figure 3c) and commodities (Figure 3d). Further details of the asset classes are provided in Appendix B. The five curves in each plot depict the average returns over one, three, six, nine, and twelve months following the recommendation broadcast.

[Please insert Figure 3 here]

Briefly, Plots 3a through 3d show that both technicians and fundamental analysts are unable to predict the S&P 500 index, equity sectors and non-U.S. equity indexes, U.S. bonds and

commodities. No clear association is observed between cumulative returns and recommendations for the S&P 500 index, equity sectors and non-U.S. equity indexes, bonds, and commodities.

Table 6 reports summary statistics similar to those exhibited in Table 3 but focusing on the broader asset classes. Staring with the market index, consistent with Figure 3a, there is no clear association between the recommendations and subsequent returns. The null hypotheses that (i) the five recommendation categories have the same return distributions, (ii) returns corresponding to buy and strong-buy fundamental recommendations and sell and strong-sell fundamental recommendations have the same distribution and (iii) the same as (ii) but for technical recommendations are generally not rejected. When they are rejected, the difference is in the wrong direction as the mean returns corresponding to sell recommendations are higher than those corresponding to buy recommendations. Similar results are obtained for equity sectors and non-U.S. equity indexes (Panel B), bonds (Panel C), and commodities (Panel D).

[Please insert Table 6 here]

In sum, the apparent success of technicians to forecast individual stock returns is the exception rather the rule. In all the other asset classes, both technicians and fundamental analysts reveal no predictive ability. Our findings thus indicate that the markets corresponding to virtually all assets are efficient, yet inefficiency appears to exist among individual stocks. This distinct difference is consistent with the hypothesis that the success of technical analysis among individual stocks relies on private signals identified from insiders trading activity. While fundamental recommendations are associated with market consensus, technical recommendations depart from such consensus and are associated with corporate insiders' trading activity.

5. Conclusion

This study employs a novel database from a TV broadcast in a head-to-head confrontation of the performance of fundamental analysts versus technicians to resolve the age-old debate between the two schools of thought and assess their economic value. The data are composed of fundamental and technical simultaneous recommendations for the same underlying assets and over similar investment horizon. The unique setup of the broadcast, featuring synchronized dual recommendations, a great variety of asset classes and the presence of leading professionals, offers an ideal laboratory in which to assess the value of financial analysis. Ultimately, both technicians and fundamental analysts are exposed to the same public information and their recommendations could differ due to the distinct toolkits applied.

The simultaneous broadcast equates analyst exposure to other analysts' consensus, eliminates time gap biases such as cross-herding among the participating analysts, and allows one to control for the immediate short-term effect of the broadcast itself. The high profile of the participating analysts levels the playing field and mitigates biases related to analysts' quality, experience, and career concerns. In addition, the broad focus of the program and the comprehensive list of assets covered make our findings general and mitigate the concerns about illiquidity biases and exceptional observations.

Consistent with the semi-strong market efficiency hypothesis, the fundamental analysis reveals little ability to predict future returns on all the assets examined. Surprisingly, the technicians exhibit a significant predicting ability of individual stock returns, which could point to market inefficiency even among the universe of the largest and most-traded stocks. For a start, trading individual stocks based on technical recommendations yields significant investment payoffs. Moreover, such stock-picking ability is unaffected by controlling for common risk

factors, firm characteristics, industry effects, the analyst's gender, education, and affiliation type (sell-side versus buy-side), market consensus, and the potential immediate impact of the broadcast.

However, the predictive ability of technicians characterizes individual stocks only. In contrast, returns on more general asset classes, including the market indexes, equity sectors and non-U.S. equity indexes, bonds, and commodities, are unpredictable. Such differential results support the notion that the predictive ability of technicians relies on the possession of proprietary investment toolkits. Considering the nature of technical analysis, one appealing explanation is that such toolkits enable their users to extract private information from informed buying and selling activities, which are more applicable to individual stocks and less so to broader asset classes. Our findings indeed support the notion that technical individual stock recommendations depart from market consensus and is positively associated with insider trading.

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Table 1: Overview of recommendation categories for various asset classes

The table displays the frequency of recommendation categories for various asset classes. The sample period is November 8, 2011 (the day when the first simultaneous fundamental–technical comparison was broadcasted) through December, 31 2014. The exact list of assets is provided in Appendix B. The Spearman’s correlation coefficient is between the numerical values of fundamental and technical recommendations (e.g., strong sell = 1).

	Fundamental	Strong Sell	Sell	Hold	Buy	Strong Buy	Total	Spearman’s Correlation
262 stocks (159 fundamental analysts – 17 females; 34 technical analysts – 3 females)	Strong Sell	12	24	10	19	7	72	0.05
	Sell	9	85	44	103	22	263	
	Hold	8	35	31	77	23	174	
	Buy	23	106	71	111	29	340	
	Strong Buy	12	38	23	34	44	151	
	Total	64	288	179	344	125	1000	
The U.S. market (S&P 500) (24 fundamental analysts – 4 females; 22 technical analysts – 3 females)	Strong Sell	0	2	0	0	0	2	0.18
	Sell	0	14	10	12	1	37	
	Hold	1	10	8	9	0	28	
	Buy	1	18	17	33	2	71	
	Strong Buy	0	2	4	3	2	11	
	Total	2	46	39	57	5	149	
58 equity sectors and non-U.S. index (34 fundamental analysts – 4 females; 28 technical analysts – 3 females)	Strong Sell	4	12	4	4	1	25	0.21
	Sell	4	31	19	15	5	74	
	Hold	1	18	20	13	2	54	
	Buy	2	28	22	32	1	85	
	Strong Buy	0	3	7	3	5	18	
	Total	11	92	72	67	14	256	
3 bond types (14 fundamental analysts – 3 females; 13 technical analysts – 2 females)	Strong Sell	0	1	0	1	0	2	0.29
	Sell	1	5	3	3	0	12	
	Hold	0	5	5	3	0	13	
	Buy	0	7	4	6	0	17	
	Strong Buy	0	1	0	2	3	6	
	Total	1	19	12	15	3	50	
17 commodities (31 fundamental analysts – 3 females; 20 technical analysts – 3 females)	Strong Sell	12	13	3	5	0	33	0.38
	Sell	5	31	6	11	2	55	
	Hold	2	11	5	4	0	22	
	Buy	1	7	7	12	0	27	
	Strong Buy	0	1	3	0	3	7	
	Total	20	63	24	32	5	144	

Table 2: Determinants of individual stock recommendations

The table reports the results of the ordered probit regression

$$REC_i = \gamma_0 + \sum_{j=1}^4 \gamma_{1j} FIRM_i^j + \sum_{j=1}^5 \gamma_{2j} R_i^j + \sum_{j=1}^3 \gamma_{3j} TREND_i^j + \sum_{j=1}^5 \gamma_{4j} CONSENSUS_i^j + \varepsilon_i,$$

where i is the stock-specific subscript and REC describes the recommendation category (1 – strong sell, 5 – strong buy). The firm’s variables ($FIRM$) are the previous-year log of market capitalization, book-to-market ratio if the previous-year book value is positive and zero otherwise, volatility measured by the daily returns over the year prior to the recommendation broadcast, and the log of the average daily trading volume over the year prior to the recommendation broadcast. The past returns variables (R) are the returns during the past six months and three years, which account for momentum and reversal, and the seasonal returns over the same month one, two and three years prior to the recommendation broadcast. The trend variables ($TREND$) are one-month returns and changes in volatility and volume during the month prior to the recommendation broadcast relative to the previous-year figures. The market consensus variables ($CONSENSUS$) are the percentage surprise in earnings per share (EPS) during the past quarter, analysts’ recommendations (1 – strong sell, 5 – strong buy) mean and standard deviation, corporate insiders trading index, which is defined as purchases less sales of corporate insiders divided by their total trades in the previous quarter, and the percentage of institutional ownership of the company stocks. The first line in each test reports the coefficient value, while the second line reports the t -value (in brackets) corresponding to heteroskedasticity-consistent Huber–White standard errors. One and two asterisks indicate a significance level of 5% and 1%, respectively.

Dependent Variable	Test	Firm Characteristics				Past Returns							Market Consensus									
		Size	Book to Market		Volatility	Volume	6 Months		3 Years			Seasonality (years)			Last Month Trend			EPS Surprise	Analysts’ Consensus		Insiders Trading	Institutional Ownership
			Volatility	Volume			1y	2y	3y	Return	Volatility	Volume	Mean	STD								
1. Fundamental Recommendation	a. Five categories	-0.047 (-0.98)	0.000 (0.43)	-24.694 (-3.07**)	0.113 (2.52*)	0.108 (0.81)	0.036 (1.25)	0.566 (1.67)	-0.338 (-0.90)	0.051 (0.15)	-0.324 (-0.89)	0.092 (0.54)	-0.058 (-0.32)	-0.036 (-1.25)	0.267 (2.61**)	-0.303 (-1.66)	0.036 (0.47)	0.265 (1.28)				
	b. Four categories (no hold)	-0.024 (-0.42)	0.003 (1.02)	-24.494 (-2.51*)	0.102 (1.93)	0.113 (0.74)	0.038 (1.12)	0.724 (1.83)	-0.475 (-1.16)	0.047 (0.11)	-0.241 (-0.59)	0.077 (0.40)	-0.039 (-0.19)	-0.039 (-1.29)	0.271 (2.43*)	-0.306 (-1.43)	0.037 (0.43)	0.312 (1.44)				
	c. Two categories (all-buy, all-sell)	-0.034 (-0.52)	0.022 (0.17)	-27.818 (-2.85**)	0.131 (2.12*)	0.219 (1.35)	0.020 (0.46)	0.481 (0.99)	0.279 (0.56)	0.642 (1.32)	-0.280 (-0.57)	0.069 (0.30)	-0.049 (-0.20)	-0.039 (-0.62)	0.301 (2.22*)	-0.555 (-2.30*)	-0.099 (-0.95)	0.192 (0.71)				
	a. Five categories	0.028 (0.64)	0.000 (0.04)	-2.081 (-0.33)	0.071 (1.71)	0.318 (2.12*)	-0.025 (-0.88)	-0.188 (-0.41)	-0.105 (-0.23)	-0.346 (-0.93)	1.647 (3.97**)	-0.198 (-1.13)	-0.019 (-0.10)	-0.108 (-2.18*)	0.194 (1.95)	0.086 (0.49)	0.202 (2.78**)	0.291 (1.69)				
	b. Four categories (no hold)	0.020 (0.41)	-0.001 (-0.55)	-2.849 (-0.39)	0.089 (1.85)	0.322 (1.95)	-0.029 (-0.91)	-0.300 (-0.51)	0.004 (0.01)	-0.481 (-1.19)	1.738 (3.71**)	-0.180 (-0.92)	-0.002 (-0.01)	-0.123 (-1.60)	0.224 (2.04*)	0.107 (0.57)	0.236 (2.96**)	0.287 (1.56)				
	c. Two categories (all-buy, all-sell)	-0.005 (-0.09)	-0.002 (-0.44)	-12.278 (-1.39)	0.142 (2.45*)	0.278 (1.42)	0.007 (0.20)	-0.264 (-0.49)	-0.075 (-0.14)	-0.109 (-0.23)	2.180 (3.89**)	-0.441 (-1.93)	0.048 (0.19)	-0.053 (-1.73)	0.189 (1.43)	0.051 (0.23)	0.174 (1.76)	0.335 (1.31)				

Table 3: Stock returns per recommendation category

The table describes the relation between the return and the recommendation category. The investment horizons are one, three, six, nine and twelve months following the recommendations. Panel A (B) considers the raw (risk-adjusted) average returns, with risk adjustment pertaining to the Fama–French and momentum factors. All sell (buy) recommendations encompass both sell and strong-sell (buy and strong-buy) recommendations. The Kruskal–Wallis null hypothesis asserts that the five categories deliver the same mean return. The Mann–Whitney null hypothesis asserts that all-buy and all-sell recommendations exhibit the same return distribution.

Period (months)	Fundamental Recommendations							Technical Recommendations											
	Strong Sell	Sell	Hold	Buy	Strong Buy	Kruskal –Wallis	All Sell	All Buy	Mann– Whitney	Strong Sell	Sell	Hold	Buy	Strong Buy	Kruskal –Wallis	All Sell	All Buy	Mann– Whitney	
A. Raw returns																			
One	Mean	1.3	1.2	1.5	0.8	2.6		1.2	1.3		-1.1	0.2	2.4	2.0	1.7		0.0	1.9	
	Std dev.	17.3	11.4	9.8	9.4	10.4		12.7	9.7		12.0	10.0	12.4	10.0	11.4		10.4	10.4	
	Skewness	1.9	1.4	2.3	-0.4	1.0		1.6	0.1		0.1	-0.4	1.1	2.1	2.8		-0.3	2.4	
	Max.	87.0	91.1	71.8	37.1	57.3	2.56	91.1	57.3	0.45	41.8	37.1	71.8	87.0	91.1	11.28	41.8	91.1	2.60
	Min.	-33.9	-39.0	-27.1	-54.7	-30.0	(0.63)	-39.0	-54.7	(0.33)	-38.3	-54.7	-33.9	-27.1	-36.0	(0.02)	-54.7	-36.0	(0.01)
Three	Mean	3.6	4.2	6.4	4.4	8.6		4.1	5.5		0.3	4.4	6.3	5.6	6.6		3.5	5.9	
	Std dev.	24.1	18.3	19.1	14.6	17.9		19.5	15.6		21.3	19.1	17.9	16.0	16.5		19.7	16.1	
	Skewness	1.0	0.6	1.2	0.1	1.1		0.7	0.6		-0.1	1.0	1.1	1.1	0.6		0.7	0.9	
	Max.	109.9	102.0	88.7	55.1	92.5	7.01	109.9	92.5	1.19	51.4	102.0	92.5	109.9	76.1	8.17	102.0	109.9	2.35
	Min.	-46.0	-64.4	-39.5	-63.8	-46.3	(0.14)	-64.4	-63.8	(0.12)	-64.4	-63.8	-40.9	-39.9	-46.3	(0.09)	-64.4	-46.3	(0.01)
Six	Mean	8.3	10.7	10.5	8.6	16.1		10.3	10.6		3.6	7.2	11.8	10.9	16.8		6.5	12.7	
	Std dev.	34.9	26.3	25.7	21.6	27.1		28.1	23.4		27.0	24.7	30.1	22.3	25.9		25.2	23.7	
	Skewness	0.9	1.4	2.3	0.5	3.2		1.2	1.7		1.1	1.0	3.2	0.6	1.5		1.0	1.0	
	Max.	134.0	166.8	199.4	119.1	216.0	10.25	166.8	216.0	1.04	119.1	130.6	216.0	134.0	166.8	27.20	130.6	166.8	4.49
	Min.	-54.2	-77.1	-53.6	-51.8	-53.1	(0.04)	-77.1	-53.1	(0.15)	-53.6	-51.8	-54.2	-77.1	-57.9	(0.00)	-53.6	-77.1	(0.00)
Nine	Mean	11.3	18.3	18.5	13.7	21.7		17.0	15.8		11.0	13.9	16.8	16.5	24.7		13.3	19.1	
	Std dev.	48.2	36.0	35.9	29.3	34.3		38.7	30.9		41.4	34.2	37.7	30.0	37.1		35.9	32.6	
	Skewness	1.8	2.2	2.4	1.1	1.9		2.0	1.4		1.7	2.0	2.5	1.5	1.9		1.8	1.7	
	Max.	238.8	242.4	258.8	199.2	217.9	8.11	242.4	217.9	0.49	199.2	242.4	258.8	238.8	236.3	14.89	242.4	238.8	3.23
	Min.	-55.5	-54.3	-58.6	-58.7	-68.7	(0.09)	-55.5	-68.7	(0.31)	-68.7	-58.7	-55.9	-58.6	-40.3	(0.00)	-68.7	-58.6	(0.00)
Twelve	Mean	7.5	23.4	26.5	20.3	25.4		20.4	21.7		16.7	19.0	21.1	22.4	30.1		18.5	24.9	
	Std dev.	56.4	41.3	40.5	35.4	32.6		44.9	34.7		47.1	40.9	39.7	36.7	38.5		42.4	37.4	
	Skewness	2.8	1.4	1.8	1.2	0.4		1.8	1.0		1.8	1.5	1.6	1.8	1.3		1.6	1.6	
	Max.	315.8	255.5	254.7	234.3	148.2	10.26	315.8	234.3	1.04	234.3	255.5	254.7	315.8	232.8	27.30	255.5	315.8	4.50
	Min.	-71.6	-62.0	-72.0	-69.6	-72.0	(0.04)	-71.6	-72.0	(0.15)	-59.2	-72.0	-71.6	-56.1	-72.0	(0.00)	-72.0	-72.0	(0.00)
B. Risk-adjusted returns																			
One	Mean	-0.7	-0.3	0.4	-0.5	0.6		-0.4	-0.2		-3.1	-1.1	0.2	0.8	0.1		-1.5	0.6	
	Std dev.	16.2	10.5	8.4	8.0	9.5		11.7	8.5		11.1	8.9	10.9	8.8	10.6		9.5	9.4	
	Skewness	1.5	1.7	1.6	-0.4	0.9		1.7	0.1		-0.2	-0.3	0.6	2.1	3.4		-0.3	2.7	
	Max.	73.6	89.4	49.8	29.7	52.6	2.56	89.4	52.6	0.66	34.0	31.7	52.6	73.6	89.4	14.77	34.0	89.4	3.28
	Min.	-35.8	-40.7	-25.1	-47.6	-31.9	(0.63)	-40.7	-47.6	(0.25)	-40.7	-47.6	-35.8	-25.1	-38.7	(0.00)	-47.6	-38.7	(0.00)
Three	Mean	-1.2	-0.6	2.0	0.0	2.5		-0.7	0.6		-4.9	-0.4	1.8	1.1	1.3		-1.4	1.1	
	Std dev.	21.5	16.9	16.6	13.0	15.7		17.8	13.8		19.2	17.2	15.8	14.2	14.8		17.7	14.4	
	Skewness	1.0	0.5	1.0	0.3	0.9		0.6	0.6		0.1	1.0	1.1	0.7	0.4		0.7	0.6	
	Max.	89.2	82.1	75.6	60.2	74.8	5.91	89.2	74.8	1.21	44.6	82.1	74.8	89.2	62.1	12.21	82.1	89.2	2.92
	Min.	-41.3	-62.4	-38.4	-59.9	-50.4	(0.21)	-62.4	-59.9	(0.11)	-62.4	-59.9	-35.5	-41.3	-50.4	(0.02)	-62.4	-50.4	(0.00)
Six	Mean	-1.4	0.8	1.9	-0.4	4.9		0.4	1.0		-5.3	-1.7	2.6	1.6	5.3		-2.5	2.8	
	Std dev.	30.4	22.9	22.2	18.2	22.9		24.4	19.7		23.0	21.2	25.5	19.5	22.0		21.7	20.4	
	Skewness	0.8	1.2	1.7	0.1	3.1		1.1	1.4		0.6	0.7	2.8	0.5	1.4		0.6	0.9	
	Max.	106.1	136.8	151.8	76.3	174.1	7.658	136.8	174.1	1.07	76.3	104.2	174.1	106.1	136.8	22.14	104.2	136.8	4.12
	Min.	-53.4	-76.2	-57.7	-56.4	-57.6	(0.11)	-76.2	-57.6	(0.15)	-57.7	-56.4	-53.4	-76.2	-62.0	(0.00)	-57.7	-76.2	(0.00)
Nine	Mean	-2.5	2.6	3.9	0.0	5.1		1.6	1.4		-3.6	-0.6	2.5	2.2	7.4		-1.2	3.8	
	Std dev.	38.7	28.0	28.0	23.5	26.9		30.4	24.6		32.6	26.9	29.3	23.9	29.2		28.2	25.8	
	Skewness	1.3	2.0	1.5	0.7	1.6		1.7	1.1		1.3	1.6	1.7	1.1	1.7		1.5	1.4	
	Max.	165.6	175.3	152.2	135.3	155.5	6.67	175.3	155.5	0.81	135.3	170.9	155.5	165.6	175.3	15.37	170.9	175.3	3.42
	Min.	-62.7	-57.9	-62.9	-65.0	-72.2	(0.15)	-62.7	-72.2	(0.21)	-72.2	-65.0	-62.7	-62.9	-52.5	(0.00)	-72.2	-62.9	(0.00)
Twelve	Mean	-9.7	2.4	5.7	1.9	4.6		0.1	2.6		-2.2	-0.2	2.2	2.5	8.0		-0.6	4.3	
	Std dev.	43.2	30.9	29.0	27.5	25.8		33.9	27.1		36.3	30.8	29.0	28.2	29.5		32.1	28.7	
	Skewness	2.2	1.1	1.2	0.8	0.1		1.4	0.7		1.2	1.1	0.8	1.4	0.9		1.2	1.2	
	Max.	205.8	158.0	132.9	142.9	84.5	19.57	205.8	142.9	2.01	142.9	158.0	132.9	205.8	151.2	11.87	158.0	205.8	2.86
	Min.	-76.3	-67.7	-72.6	-73.5	-76.1	(0.00)	-76.3	-76.1	(0.02)	-65.9	-76.1	-76.3	-64.7	-72.6	(0.02)	-76.1	-72.6	(0.00)

Table 4: Individual stock recommendations: cross-section regressions

The table reports the results of the cross-section regression

$$R_i = \gamma_0 + \gamma_1 REC_i + \sum_{j=1}^4 \gamma_{2j} FIRM_i^j + \sum_{j=1}^5 \gamma_{3j} R_i^j + \sum_{j=1}^3 \gamma_{4j} TREND_i^j + \sum_{j=1}^5 \gamma_{5j} CONSENSUS_i^j + \sum_{j=1}^2 \gamma_{6j} RECIMP_i^j + \varepsilon_i,$$

where i is the stock-specific subscript, R is the stock return over six-month period, and REC describes the recommendation category (1 – strong sell, 5 – strong buy). The firm control variables ($FIRM$) are the previous-year log of market capitalization, book-to-market ratio if the previous-year book value is positive and zero otherwise, daily returns volatility over the year prior to the recommendation broadcast, and the log of the average daily trading volume over the year prior to the recommendation broadcast. The past return control variables (R) are the returns during six months and three years, which account for momentum and reversal, and the seasonal returns over the same month one, two and three years prior to the recommendation broadcast. The trend control variables ($TREND$) are one-month returns and changes in volatility and volume during the month prior to the recommendation broadcast relative to the previous-year figures. The market consensus control variables ($CONSENSUS$) are the percentage surprise in earnings per share (EPS) during the past quarter, analysts' recommendations mean and standard deviation (1 – strong sell, 5 – strong buy), corporate insiders trading index, which is defined as purchases less sales of corporate insiders divided by their total trades in the previous quarter, and the percentage of institutional ownership of the company stocks. The recommendation broadcast's impact control variables ($RECIMP$) are the return and change in volume over two days following the recommendation broadcast.

The first line in each test reports the coefficient value, while the second line reports the t -value (in brackets) corresponding to heteroskedasticity- and autocorrelation-consistent (HAC) standard errors sorted by analysts. One and two asterisks indicate a significance level of 5% and 1%, respectively.

	Recommendation		Firm Characteristics				Past Returns						Market Consensus				Recommendation Impact					
	Const.	Fundamental	Size	Book to Market	Volatility	Volume	6 Months	3 Years	Seasonality (years)			Last Month Trend			EPS Surprise	Analysts' Consensus		Insiders Trading	Institutional Ownership	Return	Volume	
		Technical							1y	2y	3y	Return	Volatility	Volume		Mean	STD					
1a.	0.081 (2.75**)	0.007 (1.04)																				
1b.	0.017 (1.10)																					
2a.	0.002 (0.02)	0.010 (1.39)	-0.009 (-0.88)	0.000 (-2.00*)	0.791 (0.50)	0.010 (1.08)																
2b.	-0.036 (-0.29)		0.027 (6.63**)	-0.008 (-0.86)	0.000 (-1.96)	0.740 (0.67)	0.008 (0.94)															
3a.	0.089 (3.74**)	0.004 (0.65)					0.073 (2.28*)	-0.019 (-2.92**)	0.121 (0.89)	-0.016 (-0.12)	0.046 (0.73)	-0.059 (-0.51)	0.003 (0.09)	-0.060 (-1.72)								
3b.	0.019 (0.82)		0.026 (5.97**)				0.065 (2.60**)	-0.018 (-2.27*)	0.137 (0.94)	-0.017 (-0.12)	0.047 (0.54)	-0.104 (-1.37)	0.010 (0.34)	-0.060 (-2.48*)								
4a.	-0.072 (-0.77)	0.004 (0.43)													-0.007 (-1.21)	0.020 (0.84)	0.099 (3.13**)	0.046 (2.44*)	0.012 (0.41)			
4b.	-0.106 (-1.32)		0.021 (4.61**)												-0.006 (-1.15)	0.017 (0.79)	0.094 (4.16**)	0.043 (3.36**)	0.006 (0.16)			
5a.	-0.128 (-0.81)	0.007 (0.77)	0.007 (0.58)	0.000 (-1.48)	7.833 (2.69**)	-0.013 (-0.98)	0.042 (1.11)	-0.034 (-3.81**)	0.113 (0.81)	0.118 (1.10)	-0.006 (-0.10)	-0.082 (-0.60)	0.027 (0.74)	-0.012 (-0.27)	-0.026 (-3.16**)	0.049 (1.92)	0.068 (1.97*)	0.049 (2.95**)	-0.031 (-0.80)	1.026 (4.26**)	-0.056 (-3.06**)	
5b.	-0.129 (-0.92)		0.017 (2.92**)	0.007 (0.55)	0.000 (-1.62)	7.714 (2.96**)	-0.013 (-1.27)	0.038 (1.08)	-0.033 (-3.01**)	0.120 (0.64)	0.116 (1.09)	-0.001 (-0.01)	-0.114 (-1.61)	0.033 (0.98)	-0.016 (-0.37)	-0.024 (-2.78**)	0.047 (3.12**)	0.064 (2.20*)	0.045 (2.38*)	-0.035 (-0.71)	1.006 (4.44**)	-0.052 (-2.02*)
<u>Returns adjusted for risk</u>																						
6a.	-0.010 (-0.46)	0.006 (1.08)																				
6b.	-0.061 (-5.09**)		0.022 (6.63**)																			
7a.	-0.080 (-0.57)	0.007 (0.92)	0.002 (0.15)	0.000 (-2.25*)	5.752 (2.30*)	-0.012 (-1.01)	0.022 (0.65)	-0.027 (-2.72**)	0.115 (0.94)	0.130 (1.48)	-0.001 (-0.01)	-0.029 (-0.25)	0.018 (0.59)	0.004 (0.09)	-0.020 (-2.90**)	0.037 (1.64)	0.043 (1.44)	0.035 (2.53*)	-0.035 (-1.05)	0.829 (3.97**)	-0.043 (-2.69**)	
7b.	-0.082 (-0.67)		0.017 (3.39**)	0.001 (0.12)	0.000 (-2.74**)	5.634 (2.55*)	-0.012 (-1.44)	0.018 (0.60)	-0.026 (-2.53*)	0.122 (0.75)	0.129 (1.49)	0.005 (0.08)	-0.061 (-1.06)	0.024 (0.89)	0.001 (0.02)	-0.019 (-2.50*)	0.036 (2.54*)	0.039 (1.32)	0.031 (1.84)	-0.040 (-0.92)	0.808 (4.98**)	-0.039 (-1.64)

Dependent Variable	Recommendation				Firm Characteristics				Past Returns			F for A=B	
	Const.	Fundamental		Technical		Book to market	Volatility	Volume	6 Months	3 Years			
		A. Male	B. Female	A. Male	B. Female								
6-months returns	8a.	0.094 (0.74)	0.010 (1.26)	0.006 (0.65)			0.001 (0.05)	0.000 (-1.06)	2.079 (0.86)	-0.004 (-0.38)	0.042 (1.51)	-0.018 (-2.35*)	1.25 (p=0.26)
	8b.	0.053 (0.39)			0.025 (5.34**)	0.027 (2.84**)	0.001 (0.10)	0.000 (-1.03)	2.034 (1.00)	-0.005 (-0.53)	0.030 (0.92)	-0.017 (-1.77)	0.04 (p=0.84)
			A. Undergrad.	B. Grad.	A. Undergrad.	B. Grad.							
	9a.	0.090 (0.73)	0.013 (1.45)	0.005 (0.59)			0.000 (0.03)	0.000 (-1.24)	2.073 (0.86)	-0.003 (-0.34)	0.041 (1.46)	-0.018 (-2.29)	2.72 (p=0.58)
	9b.	0.053 (0.39)			0.027 (4.65**)	0.025 (5.47**)	0.001 (0.10)	0.000 (-1.03)	2.033 (1.02)	-0.005 (-0.54)	0.031 (0.92)	-0.017 (-1.82)	0.31 (p=0.26)
			A. Top 20 U.	B. Other U.	A. Top 20 U.	B. Other U.							
	10a.	0.090 (0.72)	0.007 (0.82)	0.010 (1.21)			0.001 (0.04)	0.000 (-1.07)	2.091 (0.87)	-0.003 (-0.35)	0.042 (1.49)	-0.018 (-2.32*)	0.45 (p=0.50)
	10b.	0.053 (0.39)			0.024 (5.18**)	0.027 (4.78**)	0.001 (0.10)	0.000 (-1.04)	2.015 (1.01)	-0.005 (-0.53)	0.031 (0.94)	-0.017 (-1.81)	1.66 (p=0.20)
			A. Sell-side	B. Buy-side	A. Sell-side	B. Buy-side							
	11a.	0.084 (0.68)	0.011 (1.34)	0.005 (0.57)			0.001 (0.05)	0.000 (-1.01)	2.084 (0.87)	-0.003 (-0.32)	0.043 (1.56)	-0.018 (-2.39*)	1.98 (p=0.16)
	11b.	0.042 (0.31)			0.025 (5.35**)	0.041 (5.95**)	0.001 (0.08)	0.000 (-1.01)	2.030 (1.02)	-0.004 (-0.43)	0.031 (0.93)	-0.017 (-1.83)	8.31 (p=0.00)
1-month returns	12a.	0.042 (1.19)	0.002 (0.60)			-0.002 (-0.74)	0.000 (0.05)	0.171 (0.30)	-0.001 (-0.27)	0.014 (1.41)	-0.008 (-2.98**)		
	12b.	0.032 (0.88)			0.006 (2.08*)	-0.002 (-0.65)	0.000 (0.11)	0.168 (0.30)	-0.001 (-0.42)	0.011 (1.05)	-0.008 (-3.31**)		
3-month returns	13a.	0.111 (1.22)	0.008 (0.97)			-0.006 (-0.80)	0.000 (-1.07)	0.319 (0.24)	-0.001 (-0.16)	-0.005 (-0.27)	-0.012 (-2.73**)		
	13b.	0.107 (1.31)			0.010 (2.53*)	-0.006 (-0.89)	0.000 (-0.86)	0.218 (0.18)	-0.001 (-0.24)	-0.010 (-0.86)	-0.011 (-2.44*)		
9-month returns	14a.	0.082 (0.56)	0.009 (0.85)			0.016 (1.33)	0.000 (0.09)	5.685 (2.69**)	-0.014 (-1.32)	0.018 (0.43)	0.111 (1.22)		
	14b.	0.048 (0.28)			0.025 (3.01**)	0.016 (1.41)	0.000 (0.19)	5.631 (3.00**)	-0.015 (-1.52)	0.007 (0.13)	-0.019 (-2.23*)		
12-month returns	15a.	-0.137 (-0.89)	0.022 (1.89)			0.027 (2.11*)	0.000 (0.80)	5.615 (3.79**)	-0.008 (-0.80)	0.078 (1.70)	-0.028 (-3.08**)		
	15b.	-0.148 (-0.79)			0.029 (3.73**)	0.028 (2.04*)	0.000 (0.68)	5.332 (2.96**)	-0.009 (-0.83)	0.065 (1.24)	-0.025 (-3.33**)		
6-month returns, 4 categories (no hold)	16a.	0.091 (0.74)	0.008 (0.96)			0.007 (0.52)	0.000 (0.03)	1.810 (0.72)	-0.007 (-0.70)	0.037 (1.09)	-0.017 (-2.11*)		
	16b.	0.059 (0.42)			0.025 (6.14**)	-0.001 (-0.07)	0.000 (-0.51)	0.679 (0.55)	-0.014 (-0.45)	-0.003 (-0.37)	0.047 (1.84)		
6-month returns, 2 categories (all-buy, all-sell)	17a.	0.085 (0.74)	0.003 (0.20)			0.005 (0.52)	0.000 (-0.01)	0.259 (0.18)	-0.003 (-0.37)	0.051 (1.70)	-0.013 (-1.99*)		
	17b.	0.044 (0.28)			0.057 (4.15**)	0.000 (-0.06)	0.000 (-0.48)	0.684 (0.56)	-0.002 (-0.30)	0.051 (1.91)	-0.017 (-2.13*)		
6-month returns, winsorising at 2.5%	18a.	0.062 (0.57)	0.008 (1.30)			0.001 (0.09)	0.000 (-1.25)	0.570 (0.39)	0.000 (-0.05)	0.056 (2.31*)	-0.014 (-2.20*)		
	18b.	0.027 (0.22)			0.024 (5.58**)	0.001 (0.18)	0.000 (-1.39)	0.544 (0.44)	-0.002 (-0.24)	0.045 (1.78)	-0.013 (-1.60)		
6-month returns, quantile regression ($\tau = 0.5$)	19a.	-0.139 (-1.66)	0.014 (2.28)			-0.011 (-1.20)	0.000 (-0.17)	-1.570 (-0.89)	0.020 (2.80**)	0.098 (2.95**)	-0.012 (-1.34)		
	19b.	-0.096 (-1.09)			0.020 (3.52**)	-0.006 (-0.66)	0.000 (-0.10)	-1.473 (-0.85)	0.013 (2.00*)	0.072 (2.35*)	-0.010 (-1.11)		
6-month returns, including single recommendations (no comparison)	20a.	0.053 (0.45)	0.013 (1.65)			0.001 (0.06)	0.000 (-1.08)	1.931 (0.82)	-0.002 (-0.18)	0.049 (1.75)	-0.020 (-2.48*)		
	20b.	0.034 (0.25)			0.024 (5.87**)	0.000 (-0.05)	0.000 (-0.34)	2.134 (1.13)	-0.002 (-0.27)	0.026 (0.81)	-0.017 (-2.05*)		

Table 5. Industry and style effects

The table reports the results of the following regression:

$$R_i = \gamma_0 + \sum_j \gamma_{1j} (REC_i)(FIRM_{ij}) + \varepsilon_i,$$

where R_i is the stock return or return adjusted for the Fama–French and momentum factors (R_{adj}) over six months following the recommendation broadcast; REC_i describes the recommendation category (1 – strong sell, 5 – strong buy); $FIRM_{ij}$ are firm characteristics’ dummies: six industry dummies in Panel A and three dummies in Panel B corresponding to the bottom 30%, core 40% and top 30% of the firm’s size, the book-to-market ratio, the volatility, or the past return from 2 to 12 months prior to the recommendation broadcast.

The first line in each test reports the coefficient value, while the second line reports the t -value (in brackets) corresponding to heteroskedasticity- and autocorrelation-consistent (HAC) standard errors sorted by analysts. One and two asterisks indicate a significance level of 5% and 1%, respectively.

		<u>A. Industry</u>							
		Constant	Mining	Manufacturing & Construction	Transportation & Public Utilities	Wholesale & Retail Trade	Finance, Insurance, Real Estate & Public Administration	Services	F All Industries Equal (p -value)
Number of observations									
Fundamental	R	0.083 (2.94**)	-0.037 (-3.62**)	0.007 (0.89)	0.013 (1.61)	-0.003 (-0.33)	0.008 (0.97)	0.016 (2.46*)	6.6 ($p < 0.001$)
	R_{adj}	-0.010 (-0.44)	-0.027 (-2.37*)	0.007 (0.93)	0.011 (1.62)	0.001 (0.11)	0.001 (0.15)	0.013 (2.13*)	3.6 ($p = 0.003$)
Technical	R	0.017 (0.93)	-0.022 (-1.40)	0.027 (5.02**)	0.030 (5.91**)	0.016 (1.97*)	0.026 (3.66**)	0.041 (5.24**)	12.2 ($p < 0.001$)
	R_{adj}	-0.063 (-4.61**)	-0.015 (-0.96)	0.022 (5.13**)	0.024 (5.49**)	0.016 (2.67**)	0.016 (2.51*)	0.034 (5.10**)	7.6 ($p < 0.000$)

		<u>B. Firm’s attributes</u>															
Firm’s Variable:		Size				Book to Market				Volatility				Past Return			
Recommendations:	Return Type:	Fundamental		Technical		Fundamental		Technical		Fundamental		Technical		Fundamental		Technical	
		R	R_{adj}	R	R_{adj}	R	R_{adj}	R	R_{adj}	R	R_{adj}	R	R_{adj}	R	R_{adj}	R	R_{adj}
Constant		0.080 (2.66**)	-0.012 (-0.51)	0.017 (1.09)	-0.061 (-5.06**)	0.084 (2.71**)	-0.008 (-0.34)	0.017 (1.06)	-0.062 (-5.28**)	0.091 (3.34**)	-0.000 (-0.00)	0.018 (0.98)	-0.061 (-4.52**)	0.092 (3.02**)	-0.003 (-0.11)	0.020 (1.08)	-0.060 (-4.28**)
Bottom						0.010 (1.45)	0.009 (1.47)	0.032 (7.03**)	0.026 (6.81**)	0.001 (0.09)	-0.004 (-0.37)	0.029 (4.05**)	0.020 (3.45**)	0.013 (1.09)	0.011 (1.14)	0.035 (7.40**)	0.030 (7.79**)
Core		0.017 (2.35*)	0.037 (5.64**)	0.046 (5.86**)	0.037 (5.64**)	-0.001 (-0.09)	0.001 (0.11)	0.020 (3.64**)	0.017 (4.41**)	0.016 (2.12*)	0.012 (1.94)	0.035 (5.85**)	0.028 (5.53*)	0.006 (1.01)	0.007 (1.31)	0.028 (6.07**)	0.023 (6.16**)
Top		0.005 (0.73)	0.019 (4.81**)	0.023 (5.00**)	0.019 (4.81**)	-0.001 (-0.09)	-0.003 (-0.36)	0.019 (3.23**)	0.012 (2.80**)	-0.003 (-0.53)	-0.001 (-0.21)	0.019 (3.71**)	0.018 (4.77**)	-0.001 (-0.11)	-0.001 (-0.16)	0.021 (2.97**)	0.016 (2.97**)
F all equal (p -value)						3.02 (0.05)	2.61 (0.07)	6.29 (0.00)	4.86 (0.01)	12.49 (0.00)	9.73 (0.00)	27.69 (0.00)	4.37 (0.01)	2.42 (0.09)	2.68 (0.07)	2.20 (0.11)	2.75 (0.06)
F bottom equal top (p -value)		2.27 (0.13)	4.84 (0.03)	5.22 (0.02)	5.17 (0.02)	3.85 (0.05)	4.39 (0.04)	2.62 (0.11)	6.29 (0.01)	0.16 (0.69)	0.09 (0.77)	2.37 (0.12)	0.15 (0.70)	2.08 (0.15)	2.39 (0.12)	3.76 (0.05)	5.15 (0.02)

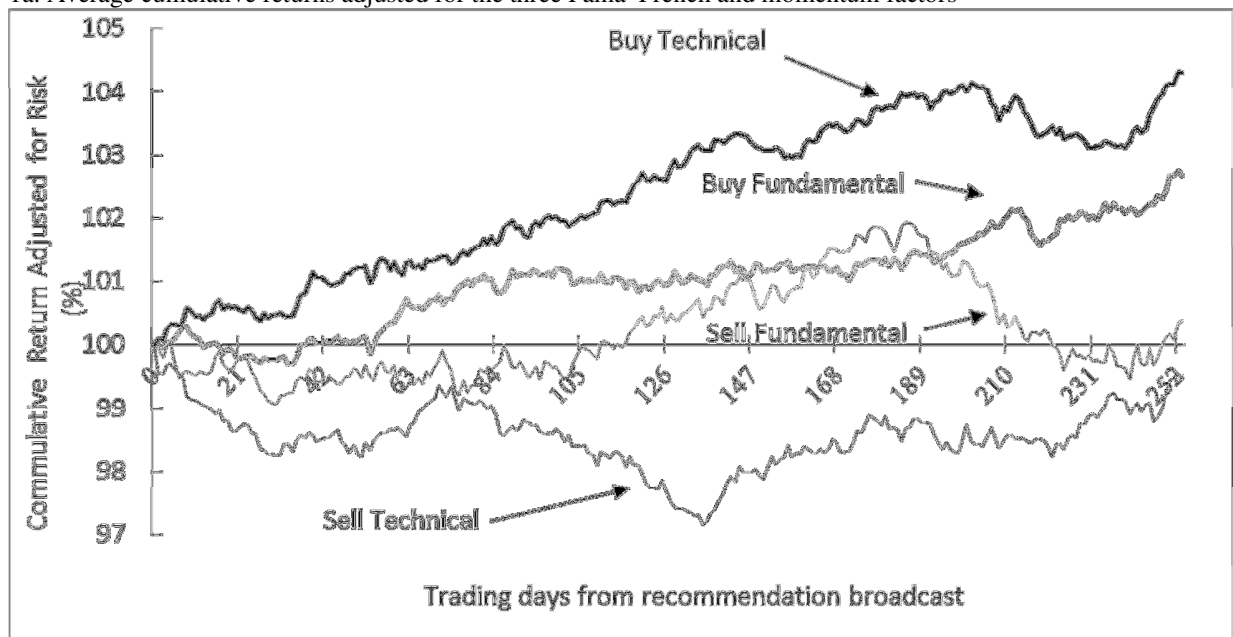
Table 6. Summary statistics of the average returns on broader asset classes

The table reports the summary statistics of the returns on various asset classes for each recommendation category over one, three, six, nine and twelve months following the recommendations broadcast. The asset classes are the S&P 500 index, equity sectors and non-U.S. equity indexes, U.S. bonds and commodities. The Kruskal–Wallis test’s null hypothesis asserts that the investment mean returns based on the five categories have the same distribution. The Mann–Whitney test’s null hypothesis asserts that all-buy and all-sell recommendations have the same distribution. When no statistic exists, it is denoted as “not applicable” (na).

Period		Fundamental Recommendations						Technical Recommendations							
		Strong Sell	Sell	Hold	Buy	Strong Buy	Kruskal–Wallis	Mann–Whitney	Strong Sell	Sell	Hold	Buy	Strong Buy	Kruskal–Wallis	Mann–Whitney
<u>A. The U.S. S&P 500 index</u>															
1 month	Mean	3.9	2.2	1.0	1.6	2.4			3.9	2.1	2.5	1.2	1.1		
	Std dev.	1.8	2.4	3.3	2.7	1.7			1.5	2.9	3.0	2.5	3.0		
	Skewness	na	0.5	-0.4	0.1	0.5			na	-0.5	-0.6	0.0	0.3		
	Max.	5.6	8.9	7.8	7.9	4.8	5.25	1.48	5.4	8.9	7.9	8.9	6.7	9.11	2.20
	Min.	2.1	-2.4	-6.7	-5.6	0.6	(0.26)	(0.07)	2.4	-6.7	-6.5	-5.6	-3.9	(0.06)	(0.01)
3 months	Mean	7.6	4.1	4.8	4.3	4.0			4.5	4.3	5.0	4.2	4.9		
	Std dev.	1.5	3.6	2.4	3.5	3.1			1.4	3.6	3.3	3.2	2.7		
	Skewness	na	0.1	-0.4	1.1	0.6			na	0.7	-0.9	0.8	1.0		
	Max.	9.2	14.7	10.4	15.8	9.0	5.65	0.61	5.9	14.7	10.4	15.8	10.7	3.52	0.06
	Min.	6.1	-4.7	-1.3	-1.4	0.1	(0.23)	(0.27)	3.0	-1.4	-4.7	-3.0	1.4	(0.48)	(0.48)
6 months	Mean	13.9	8.2	7.7	7.5	7.6			11.4	8.3	8.0	7.5	8.0		
	Std dev.	1.7	2.9	3.3	3.1	2.6			4.4	2.9	2.9	3.3	2.7		
	Skewness	na	0.4	0.8	0.3	1.5			na	0.7	-0.7	0.8	0.6		
	Max.	15.6	15.9	18.4	15.8	12.5	6.23	1.57	15.9	15.8	12.5	18.4	12.5	3.56	1.43
	Min.	12.2	3.3	1.6	2.2	4.8	(0.18)	(0.06)	7.0	2.8	1.6	2.2	4.5	(0.47)	(0.08)
9 months	Mean	16.3	10.9	11.1	9.4	10.6			13.2	11.1	11.5	9.2	13.1		
	Std dev.	1.1	4.0	4.4	7.2	4.2			4.3	4.5	4.5	6.5	3.9		
	Skewness	na	0.9	0.1	-0.4	-0.3			na	1.1	-1.5	-0.3	0.5		
	Max.	17.4	21.5	22.5	22.6	16.7	3.87	0.73	17.5	22.6	17.6	22.2	20.9	6.92	0.63
	Min.	15.2	5.6	0.7	-5.0	3.8	(0.42)	(0.23)	8.9	5.6	-4.4	-5.0	7.1	(0.14)	(0.47)
12 months	Mean	22.6	13.6	12.0	14.9	17.1			19.4	13.9	14.5	13.1	15.3		
	Std dev.	2.1	6.0	7.9	8.0	4.6			5.2	7.0	4.4	8.0	9.6		
	Skewness	na	0.5	-0.3	-0.5	0.2			na	0.4	-1.8	-0.2	-0.8		
	Max.	24.7	29.9	30.9	34.1	23.8	9.36	1.38	24.7	34.1	20.5	30.9	30.5	2.74	0.07
	Min.	20.5	-0.6	-2.7	-4.6	10.8	(0.05)	(0.08)	14.2	-2.7	-0.6	-2.7	-4.6	(0.60)	(0.43)
<u>B. Equity sectors and non-U.S. equity indexes</u>															
1 month	Mean	3.1	0.8	1.6	1.6	1.6			1.7	1.3	1.6	1.3	0.7		
	Std dev.	4.4	5.8	3.9	4.4	4.8			4.3	4.9	5.0	5.1	3.8		
	Skewness	0.9	-0.7	-0.6	-0.6	-0.3			0.5	-1.0	0.1	-1.2	-0.4		
	Max.	11.4	17.6	12.5	11.3	10.1	1.51	0.58	15.3	11.4	17.6	13.2	7.1	0.69	0.48
	Min.	-2.4	-21.6	-12.1	-14.3	-9.5	(0.83)	(0.28)	-9.1	-15.0	-12.8	-21.6	-8.2	(0.95)	(0.32)
3 months	Mean	5.9	3.1	4.4	4.2	2.9			3.4	5.0	4.1	3.4	1.6		
	Std. dev.	9.2	8.6	6.1	8.2	4.8			7.3	6.9	8.8	7.5	8.3		
	Skewness	0.9	-1.0	0.0	-0.5	0.2			0.9	-0.2	-0.7	-1.0	-1.2		
	Max.	27.9	26.6	22.8	27.1	12.6	2.26	0.55	25.4	27.9	27.1	19.4	16.8	4.44	1.30
	Min.	-8.0	-33.4	-13.2	-23.2	-5.9	(0.69)	(0.29)	-8.0	-21.7	-33.4	-26.7	-23.2	(0.35)	(0.01)
6 months	Mean	9.7	5.2	6.1	4.6	5.0			6.6	5.8	6.2	4.4	5.4		
	Std dev.	7.3	10.8	9.0	10.9	7.5			10.1	9.1	9.6	11.0	10.7		
	Skewness	1.1	-1.0	0.0	-0.8	1.4			-1.3	-0.9	0.3	-1.2	0.5		
	Max.	25.5	29.9	35.5	30.6	26.2	2.11	0.88	29.9	26.2	35.5	30.6	33.6	1.37	1.05
	Min.	2.3	-35.7	-23.1	-29.1	-5.4	(0.72)	(0.19)	-29.0	-20.8	-23.3	-35.7	-17.2	(0.85)	(0.15)
9 months	Mean	13.6	7.8	9.9	8.2	5.8			10.2	8.1	10.3	7.6	8.6		
	Std dev.	8.3	13.0	11.1	15.8	14.1			12.7	12.3	12.9	14.5	13.3		
	Skewness	1.2	-1.0	0.6	-0.5	0.1			-2.1	-0.9	0.7	-0.5	-0.4		
	Max.	32.2	45.7	50.9	51.8	37.3	2.29	0.26	33.0	37.3	51.8	45.7	40.1	1.24	0.73
	Min.	5.5	-38.3	-18.0	-34.8	-19.3	(0.68)	(0.40)	-38.3	-31.0	-23.6	-36.9	-26.3	(0.87)	(0.23)
12 months	Mean	17.7	8.4	12.5	11.8	13.2			10.7	10.5	12.4	10.7	11.9		
	Std dev.	10.7	17.9	12.4	19.9	5.4			11.0	15.4	16.3	19.5	16.6		
	Skewness	0.5	-0.7	-0.1	-0.8	-0.5			-1.8	-0.6	0.0	-0.9	-2.3		
	Max.	36.1	66.2	53.1	59.0	20.5	4.53	1.14	31.0	44.8	59.0	66.2	36.2	0.95	0.65
	Min.	3.4	-54.2	-27.8	-47.8	3.8	(0.34)	(0.13)	-29.3	-30.9	-46.2	-54.2	-42.3	(0.92)	(0.26)

Period		Fundamental Recommendations						Technical Recommendations							
		Strong Sell	Sell	Hold	Buy	Strong Buy	Kruskal-Wallis	Mann-Whitney	Strong Sell	Sell	Hold	Buy	Strong Buy	Kruskal-Wallis	Mann-Whitney
<u>C. Bonds</u>															
1 month	Mean	1.2	0.6	0.5	-0.5	-0.6			-1.0	0.8	0.8	-0.5	0.1		
	Std dev.	0.0	1.3	1.4	2.5	1.5			2.4	1.6	1.4	2.1	1.3		
	Skewness	na	0.6	-0.5	-0.6	1.0			na	0.0	-0.4	-1.0	-0.9		
	Max.	1.2	3.9	2.6	3.4	1.4	2.58	1.52	1.4	3.9	3.4	2.6	1.4	4.76	1.44
	Min.	1.2	-1.8	-1.7	-6.2	-2.1	(0.63)	(0.06)	-3.4	-1.6	-2.4	-6.2	-2.1	(0.31)	(0.08)
3 months	Mean	2.3	0.9	1.8	-0.5	-0.2			0.2	1.6	2.0	-0.8	0.3		
	Std dev.	0.0	2.4	1.1	2.9	1.3			0.7	1.2	1.7	3.1	1.1		
	Skewness	na	-0.3	0.2	-1.8	-1.4			na	-0.6	1.1	-1.1	-1.4		
	Max.	2.3	6.2	3.9	2.6	1.0	9.27	2.02	0.9	3.6	6.2	2.9	1.4	12.15	2.38
	Min.	2.3	-3.9	0.2	-8.4	-1.9	(0.06)	(0.02)	-0.5	-0.7	-0.1	-8.4	-1.9	(0.02)	(0.01)
6 months	Mean	6.3	2.2	2.9	0.6	-0.2			0.7	3.5	2.6	0.6	0.5		
	Std. dev.	0.0	2.8	2.0	4.0	2.1			2.2	3.0	2.4	3.5	2.6		
	Skewness	na	-0.1	-1.2	-0.3	-1.7			na	0.3	-1.2	-1.0	-0.5		
	Max.	6.3	8.6	5.5	8.3	1.5	8.68	1.81	2.9	8.6	5.2	5.2	3.9	5.58	1.63
	Min.	6.3	-3.2	-2.3	-7.5	-3.2	(0.07)	(0.04)	-1.5	-1.3	-3.2	-7.5	-3.2	(0.63)	(0.05)
9 months	Mean	5.6	2.4	2.8	2.2	2.5			3.0	3.5	2.5	1.4	3.4		
	Std dev.	0.0	3.9	2.9	4.0	2.5			3.3	1.7	2.4	5.0	3.4		
	Skewness	na	-0.7	0.5	-0.6	-1.1			na	-0.9	1.7	-0.2	-0.1		
	Max.	5.6	9.7	9.2	9.6	5.1	1.35	0.12	6.2	5.7	9.2	9.7	8.4	3.04	1.16
	Min.	5.6	-8.9	-2.0	-6.2	-0.9	(0.85)	(0.45)	-0.3	0.1	-0.6	-8.9	-1.0	(0.55)	(0.12)
12 months	Mean	2.5	2.6	5.5	2.6	2.7			4.9	4.0	4.8	1.2	3.4		
	Std dev.	0.0	3.5	3.2	3.3	1.9			3.5	1.8	3.2	3.8	1.8		
	Skewness	na	-2.0	0.0	-1.3	-1.5			na	0.4	0.4	-1.6	-1.5		
	Max.	2.5	8.3	10.1	6.2	4.4	3.03	0.48	8.3	7.6	10.1	6.2	5.3	5.39	1.69
	Min.	2.5	-9.1	0.9	-5.0	0.0	(0.55)	(0.32)	1.4	0.9	0.7	-9.1	0.0	(0.25)	(0.05)
<u>D. Commodities</u>															
1 month	Mean	0.0	-2.0	-4.5	-2.3	-0.8			-2.9	-1.5	-2.2	-2.4	-3.2		
	Std dev.	4.7	7.2	9.1	6.6	5.3			6.0	8.8	6.8	5.8	3.0		
	Skewness	-1.4	-0.2	-0.7	0.0	-0.3			-0.9	-0.7	-1.2	0.6	-1.3		
	Max.	6.0	19.5	14.3	10.0	7.0	5.75	0.64	6.9	19.5	10.3	14.3	0.0	2.72	0.98
	Min.	-14.6	-23.7	-26.5	-16.8	-9.4	(0.22)	(0.26)	-20.6	-26.5	-22.9	-11.8	-9.4	(0.61)	(0.16)
3 months	Mean	-3.4	-4.9	-6.6	-1.6	-7.6			-6.1	-3.8	-1.6	-4.8	-7.0		
	Std dev.	11.3	13.5	11.3	9.4	8.1			15.1	12.2	10.6	8.5	6.1		
	Skewness	-1.9	-1.5	-0.6	-1.3	-0.2			-1.6	-1.0	-1.5	-1.5	-1.3		
	Max.	8.2	18.3	9.8	16.1	4.0	5.19	0.62	9.8	18.3	11.7	9.3	1.6	4.10	1.43
	Min.	-37.5	-46.3	-34.6	-33.9	-20.3	(0.27)	(0.27)	-46.3	-37.5	-35.7	-33.9	-20.3	(0.39)	(0.08)
6 months	Mean	-8.7	-9.1	-10.7	-8.2	-9.4			-10.7	-8.4	-8.3	-9.7	-7.3		
	Std dev.	12.6	14.7	17.2	9.3	4.9			15.0	13.8	14.4	12.3	5.0		
	Skewness	-1.9	-1.4	-1.1	-1.1	-0.6			-1.4	-1.5	-1.8	-0.6	-0.9		
	Max.	3.0	15.2	24.1	11.3	-3.5	1.95	1.22	3.7	15.2	9.5	24.1	-0.9	2.54	1.28
	Min.	-45.9	-51.2	-56.1	-33.5	-17.2	(0.74)	(0.11)	-45.9	-51.2	-56.1	-44.0	-17.2	(0.64)	(0.10)
9 months	Mean	-10.9	-12.0	-14.3	-9.8	-12.9			-10.4	-11.9	-12.4	-13.4	-8.7		
	Std dev.	13.3	15.4	18.1	16.3	8.9			14.1	16.3	15.5	17.7	6.5		
	Skewness	-1.6	-1.0	-0.7	-1.8	0.4			-1.2	-1.0	-1.5	-1.1	-1.4		
	Max.	2.7	18.7	23.8	10.1	-2.0	2.31	0.80	10.1	18.7	2.7	23.8	-2.0	0.90	0.84
	Min.	-42.6	-55.7	-56.0	-62.4	-22.5	(0.68)	(0.21)	-41.9	-55.7	-55.6	-62.4	-22.5	(0.92)	(0.21)
12 months	Mean	-11.9	-12.3	-14.1	-10.0	-11.1			-10.6	-11.4	-13.6	-13.7	-8.4		
	Std dev.	14.2	15.9	16.3	15.1	6.8			16.2	16.8	13.1	14.8	5.1		
	Skewness	-2.3	-1.2	-1.0	-0.6	0.7			-2.0	-1.2	-0.9	-0.3	-0.5		
	Max.	3.0	20.4	13.0	11.6	-1.2	1.17	0.57	13.6	20.4	3.8	13.0	-1.2	1.71	0.81
	Min.	-57.5	-56.7	-56.4	-46.6	-17.4	(0.88)	(0.29)	-57.5	-56.7	-46.6	-44.1	-16.2	(0.79)	(0.21)

1a. Average cumulative returns adjusted for the three Fama–French and momentum factors



1bc. The spread in returns on buy and sell portfolios

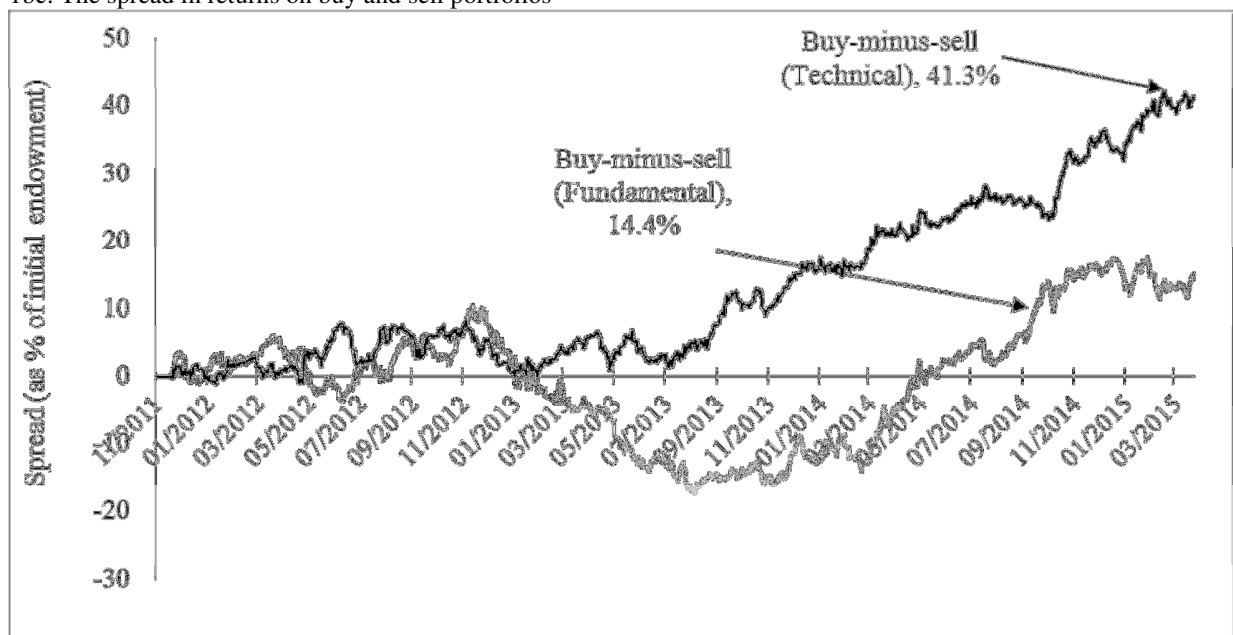
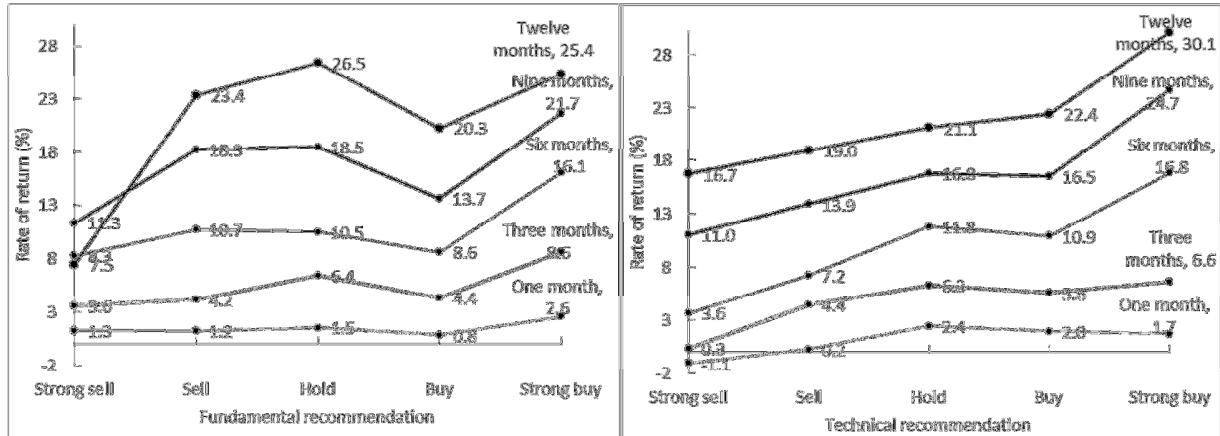


Figure 1. Returns and recommendations

The top panel depicts the average returns adjusted for the three Fama–French and momentum factors for the technical and fundamental all-buy (buy and strong-buy) and all-sell (sell and strong-sell) recommendations, starting from the recommendation broadcast (day zero) closing price and ending twelve months afterwards. The bottom panel presents the return spreads on buy-minus-sell technical portfolio and buy-minus-sell fundamental portfolio. All recommended stocks in the portfolios are bought for a twelve-month period starting at the closing price of the recommendation broadcast’s day and they are equally weighted in each portfolio.

2a. Raw returns



2b. Adjusted returns

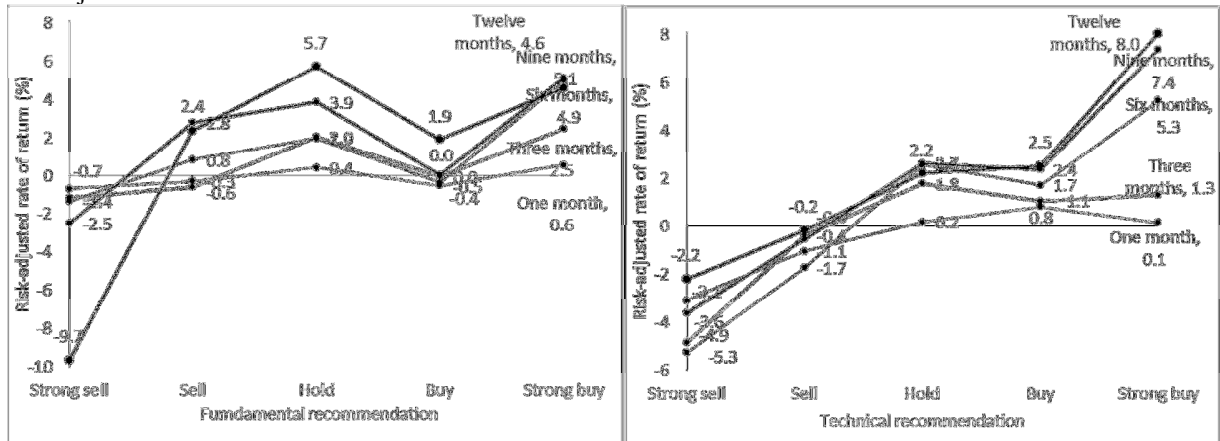
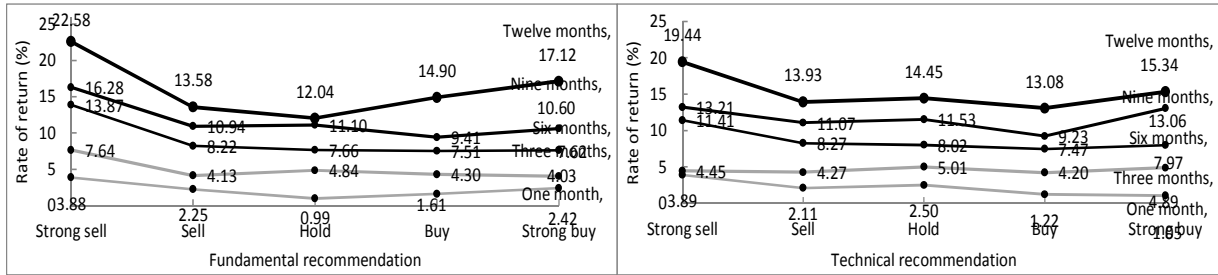


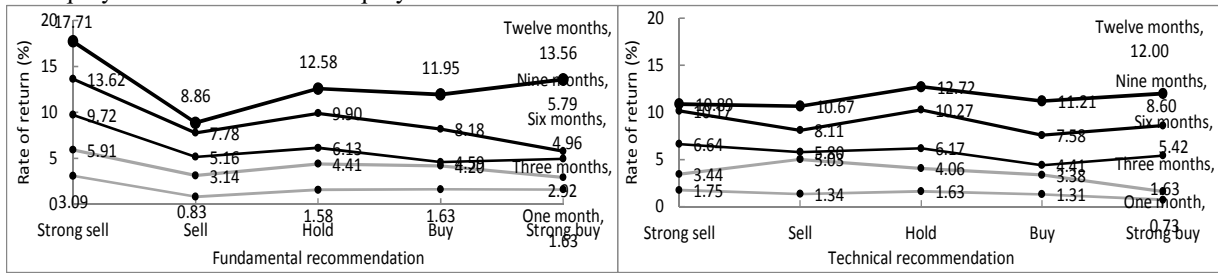
Figure 2. Average stock return per recommendation category for various investment horizons

The figure depicts the average returns on stocks for the strong-sell, sell, hold, buy and strong-buy categories. The five curves in each diagram exhibit average returns over one, three, six, nine and twelve months following the recommendation's broadcast. The left (right) figures pertain to fundamental (technical) analysis. The top figures exhibit the raw returns, while the bottom figures display the returns adjusted for the three Fama–French and momentum factors.

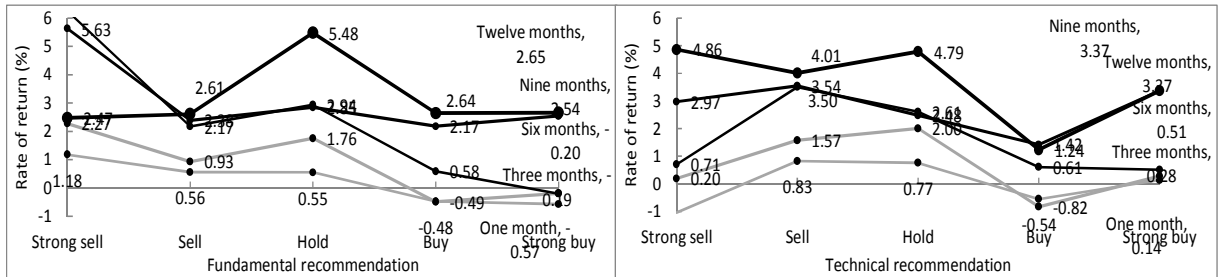
3a. S&P 500



3b. Equity sectors and non-U.S. equity indexes



3c. U.S. bonds



3d. Commodities

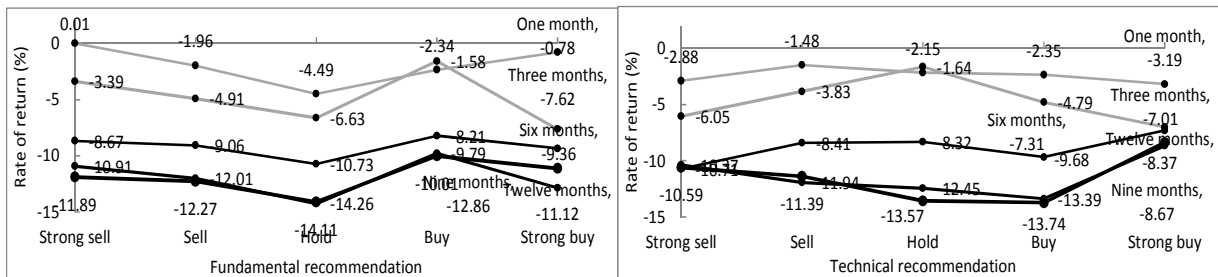


Figure 3. Average returns on various asset classes

The figures present the average returns on various assets over one, three, six, nine and twelve months after broadcasting fundamental recommendations (left-hand figures) and technical recommendations (right-hand figures). The underlying assets are the S&P 500 index, equity sectors and non-U.S. equity indexes, U.S. bonds, and commodities.

Appendix A. Classification of recommendations

The appendix explains how recommendations are collected from the “Talking Numbers” program and classified into five conventional categories. We then demonstrate the classification of a specific program.

Prior to May 2013, “Talking Numbers” was exclusively hosted by the CNBC television network. For that period, we approached the broadcasts using two main sources: the CNBC archive at video.cnbc.com and The Internet Archive’s TV news research service at archive.org. We also employed several net-searching practices to detect programs that were missing from the main data archives. Since May 2013, CNBC and Yahoo Finance have jointly hosted the show. The main source of programs after the merge is Yahoo Finance at finance.yahoo.com. This source is organized chronologically and contains all the post-merger programs. Overall, we were able to cover the vast majority, if not all, of the “Talking Numbers” recommendations during the sample period.

If the analyst provides a formal rate the classification adheres to the explicit rating. Otherwise, we systematically extract the recommendation category based on the category definitions below and the list of terms that describe the category. We viewed all the programs twice and classified them separately into each of the five recommendation categories. In most cases, the two classifications were identical. In the presence of a mismatch, the program was viewed again and the final classification was delivered.

The strong-buy category features distinct and enthusiastic recommendations to buy an asset without any reservation. Any expectation of at least a 20% gain during the coming year (expressed directly or implied by the analyst’s price target) falls within this category. The following expressions are translated as strong buy: “strong buy”, “time to buy buy buy”, “great buying opportunity”, “I am a big buyer”, “keep buying the stock”, “brilliant buy”, “you have to buy it”, “I’m absolutely a buyer”, “you definitely want to hold it”, “you have to be long”, “you must own it”, “love the asset”, “love the chart”, “we love it”, “I like everything”, “very clear bullish pattern”, “very strong bullish pattern”, “very clear bullish signal”, “very bullish indication”, “very positive”, “very attractive”, “very very bullish setup”, “very optimistic”, “looks phenomenal”, “looks wonderful”, “looks perfect”, “this chart looks like a winner”, “does look very good”, “now it is a great time to own the stock”, “you have to own”, “a lot of reasons to own the stock”, “extremely compelling valuation”, “extremely compelling buy”, “extremely strong”, “fantastic”, “delicious”, “exciting”, “incredible”, “fundamentals are phenomenal”, “great numbers great stock”, “from strength to strength”, “this stock is on fire”, “I am super-fired on the stock”, “the stock is a rock”, “the sky is the limit”, “going to the roof”, “a great place to be”, “extreme oversold”, “bright future”, “uniquely compelling”, “tremendous opportunity”, “does not get better”, “outstanding (technical) position”, “expect high returns”, “going a lot higher”, “continue to run”, “the stock is coiling for a big move up”, “plenty higher prices”, “much higher prices”, “plenty room for upside”, “plenty of more upside”, “we’re going to get a big breakout”.

The buy category characterizes a buy recommendation with reservations that do not deter anybody from immediately buying the asset, a clearly positive business forecast and the use of positive terms such as “cheap” and “overweight.” For example, if an analyst suggests starting to buy the asset and increase buying as a pullback emerges, such an explicit recommendation would be classified as a buy. However, if an analyst recommends waiting for a pullback and only then buying the asset, that contingent recommendation would be classified as a hold. Expressions that are translated as buy: “buy”, “we buy”, “it’s a buy”, “I would be a buyer”, “comfort to buy”,

“buying opportunity”, “compelling buy on risk reward basis”, “I would buy this chart”, “I am a buyer here”, “you want to buy the sector”, “buy when there is blood in the streets”, “a buying opportunity”, “buyers are going to overwhelm sellers”, “it is a stock to own”, “you want to be long”, “chase it”, “I am long”, “great name to play”, “buy on any pullback”, “the chart says it is a buy”, “constructive chart”, “chart is constructive”, “good chart”, “I expect the chart to head higher”, “I expect the chart to go higher”, “bullish chart”, “bullish continuation patten”, “(bullish) trend is intact”, “bullish flag”, “fairly bullish”, “bearish to bullish reversal”, “mildly bullish”, “relatively bullish”, “very constructive”, “very interesting”, “very nice uptrend”, “very nice opportunity”, “very nice trade”, “very positive sign”, “I see positive signs”, “positive forecast”, “positive on the longer term”, “the trend is positive”, “no sign for a change in (positive) trend”, “no indicator for a change in (positive) trend”, “nice uptrend”, “well-defined uptrend”, “good entry point”, “compelling entry point”, “attractive entry point”, “good time to hold it”, “looks good”, “good investment”, “all good”, “good to be long”, “still looks good”, “good risk-reward”, “decent risk-reward”, “I like it here”, “I like it at this level”, “you can jump in”, “I am on board”, “you want to remain in the sector”, “set to a breakout”, “about to break”, “we are looking for a breakout”, “I think it will go up”, “price will go up”, “expect a rally”, “move higher”, “I expect the stock to move higher”, “the next move is higher”, “headed in the right direction”, “moving above average”, “more upside than downside”, “plenty of upside”, “there is upside potential here”, “strong case for upside”, “sentiment is in favor”, “play the momentum”, “play the momentum from the long side”, “I’m optimistic on it”, “optimistic”, cheap”, “overweight” “quite attractive”, “great leadership”, “solid business”, “strong foundations”, “healthy”, “priced for the bad news”, “oversold”, “will bounce back”, “chance to recover”, “form a bottom”, “back on track”, “a lot of reasons to hold the stock”, “I do see value there”, and any price target (if given) which is 10%-20% above than current price.

The strong-sell category consists of distinct recommendations to sell the asset immediately without any reservation, which is occasionally even accompanied by a suggestion to sell it short. Any expectation of at least a 20% price drop during the coming year falls within this category. Expressions that are translated as strong sell: “strong sell”, “I am a seller”, “I would be a seller right here”, “sell and run away”, “dump the stock”, “you want to be a seller”, “you want to be out”, “step off”, “dump the stock”, “I would be aggressive seller”, “get out of it”, “sell with confidence”, “sell short”, “compelling short sell”, “it’s time to bet against the stock”, “massive short”, “I want to be short”, “looking to short it”, “short signal”, “very bearish”, “ultra bearish”, “very bearish setup”, “the chart is a disaster”, “trend is very negative”, “terrible”, “the stock goes straight down”, “going down big time”, “price is going lower!”, “goes from bad to worse”, “going a lot lower”, “big pullback”, “clearly a sell”, “the party is over”, “poised to roundtrip down”, “massively overvalued”, “dead money”, “a failure”, “a broken story”, “uniquely vulnerable”, “streaming to the exit”, “any name but this stock”, “I hate it”, “will not buy it under any circumstances”, the stock worth nothing”, “there is nothing here”, “you want to avoid it”, “downward spiral”, “crappy, a lot of crap”, and “the show is over”.

The sell category features a sell recommendation with reservations that do not deter anybody from immediately selling the asset, a clearly negative business outlook, a distinct “do not buy” statement and the use of the following terms: “sell”, “will be a seller”, “I would be a seller”, “it is a sell”, “more selling pressure”, “selling pressure”, “go for the sell”, “keep selling”, “it is a selling point”, “call it a day”, “take your money”, “out of asset”, “I sold it”, “I’m out of it”, “I would not touch it”, “stay away”, “avoid this stock”, “I would not buy it”, “don’t buy it”, “do not buy!”, “definitely not buy”, “you are better off buying other assets”, this is not a chart

I'm going to buy", "I would not buy the stock", "let someone else buy it", "no reason to buy", "we would definitely not buy it", "I would not hold it", "take your money and run", "take some profits", "we avoid", "stay away", "keep away", "I watch from the sidelines", "I stay on the sidelines", "leave it alone", "time to take profits", "trim your profits", "take the money of the table", "I am against the asset", "I do not want to hold it", "it is not the place to put your money", "dislike", "I do not like the odds", "do not like it", "I don't like the risk reward", "not the space you want to be", "do not hold it", "keep away", "lousy stock to own", "not the time to own this stock", "no reason to be involve with", "don't touch it", "I'm out", "further weakness", "there is a downside", "it is going lower", "will go lower", "It's going lower", "price will not hold", "looks bad", "side winds ahead", "bearish chart", "bearish divergence", "bear market", "bearish pattern", "bearish technically", "I'm bear on this stock", "I am in the bearish camp", "(bearish) trend is intact", "mounting evidence of bearish", "more bearish than bullish", "pretty bearish", "bearish formation", "a broken chart", uninspiring chart", "bull trap", "(positive) trend reversal", "vulnerable", "technically vulnerable", "stock looks vulnerable", "gone too far too fast (upward)", "too far above its trend line", "this chart is broken", "the (upward) angle is unsustainable", "(price) unsustainable", "very expensive". "(price) extremely stretched", "expensive", "underperform", "overbought", "not attractive", "unjustified price", "cheap for a reason", "does not look right", "pricy", "price devaluation", "pricing does not make sense", "(value) much to rich", "valuation is tough", "price far too high", "(price) too high", "pricing does not make sense", "very concerned", "concerns", "serious problems", "negative", "negative forecast", "too risky", "sick", "I see weakness", "I see weakness all the board", "the story only gets worse", "something is wrong", "true threat", "challenging", "a challenge", "overdone", "game over", "comes to its end", "dead cat bounce", "catching a falling knife", "never try catching a falling knife", "negative momentum", "shaky grounds", "not interested in...", "going nowhere", "will lag", "much better in other names (of companies)", "no sign for a change in (negative) trend", "no indicator for a change in (negative) trend", "hold off", "expect a decline", "It's going down", "continue to fall", "continue to go down", "going to pull back", "more things to downside", "we will see a break to the downside", "a break to the downside is more likely", "the trend remains down", "risk-reward tends to be downside", "momentum is for the downside", "will probably go lower", "will probably fall", "I see weakness continues", "more downside from here", "ready to break to downside", "I expect a large pullback", "price going down ten percent", and price target (if given) which is 10%-20% below than current price.

The hold category consists of all recommendations to hold the asset or recommendations featuring assets as "market performance" and "neutral." To avoid subjective judgment biases and misinterpretation, we attribute mixed, contingent or depends on future event, ambiguous (e.g. "may rally but looks weak", "going to break one side or another", "at a critical point"), and contradictory recommendations (e.g. over mid and long time-horizons within the range of one month and one year) to the hold category. This classification guarantees that the buy and sell categories are unambiguous and transparent. Terms that are translate as hold: "hold", "weak hold", "holding pattern", "mixed", "mixed bag", "neutral", "market performance", "market stock", "sector perform", "fairly valued", "fair value", "it's priced fairly", "price is fair", "price target is equal to current price", "equal-weight", "O.K.", "only O.K.", "results are only O.K.", "O.K. shape", "looking O.K.", "right pricing", "boring", extremely boring", "not impressed", "so what?...", "pause", "flat", "I go flat", "a range bound", "be cautious", "I'm cautious", "be careful", "be careful to enter the position", "wait", "wait before buy", "wait for (some value, e.g. 10%) pullback to buy", "wait for a better entry point", "wait until...", "wait to...", "I rather

wait”, “not something we would buy today but...”, “I will not commit more capital”, “would not commit new capital”, “would not commit fresh capital”, “not convinced to buy”, “I’m not sure it is time to jump on the wagon”, “not a compelling entry level”, “not the right entry point”, “looking for a catalyst”, “we need more information”, “need to watch the market response”, “we need to see confirmation (for potential trend)”, “no catalyst in sight”, “could go either way”, “inflection point”, “indecision”, “I don’t know how to trade”, “anything is possible”, “bear and bull tensions”, “bear and bull battle”, “risk reward proposition is symmetrical”, “watch from the sideline”, “stay on the sideline”, “stay on the sideway”, “do nothing”, “a little upside”, “upside is limited”, “there is no upside”, “all the good news in the stock”, “much of the story is already in price”, “not a great fan of”, “not a fan”, “I’m not very excited”, “not that great”, “It is hard to be enthusiastic”, “a little speculative”, “market got ahead of itself”, “close to a buy”, “I would not chase it and would not short it”, “there are signs of hopes”, “a little skeptical”, “a little concerned”, “I would be a buyer if...(future event, e.g. price goes to...)”, and “I would be a seller if...(future event)”

To illustrate the classification process, below we present a program summary published by Yahoo. Based on the strict “stay away” cite, we classified the fundamental recommendation as sell. Based on “looks very good,” “very bullish indication,” “plenty of more upside” and “continue to run,” the technical recommendation was classified as strong buy. It should be emphasized that we made the classifications according to the full discussion in the program rather than only according to the summary by Yahoo, which is presented here for illustration purposes, as the full discussion usually includes more classification words and additional clarification.

This hot stock may perk up even more

By Lawrence Lewitinn August 22, 2014 4:31 PM, available at:

<http://finance.yahoo.com/blogs/talking-numbers/this-hot-stock-may-perk-up-even-more-203126642.html>

Shares of Keurig Green Mountain were percolating on Friday thanks to a deal with Kraft Foods. But while the stock has been on fire for the last couple of years, could investors get roasted in the months ahead? Though Keurig Green Mountain’s stock is up over 77 percent year-to-date – and has more than quintupled in the last two years – Chad Morganlander, portfolio manager at Stifel Nicolaus Washington Crossing Advisors, is not warm on the stock.

“We at Stifel have a hold recommendation on it,” Morganlander said. Stifel Nicolaus makes a market in Keurig Green Mountain’s stock. “As a value manager, I believe that this stock is somewhat frothy,” said Morganlander, noting that the stock trades around 34 times its 2015 expected earnings. Morganlander is also wary on the company itself. “The business model is somewhat sketchy here when it comes to pricing,” he said. “There are competitive issues that they will have in the coming years.” Keurig Green Mountain may not be the best investment idea, according Morganlander. “You want to be somewhat more pragmatic about investing in it,” he said. **“This is bubblicious to me. Stay away.”**

Steven Pytlar, chief equity strategist at Prime Executions, is more optimistic on Keurig Green Mountain based on the technicals. “It does **look very good** on the charts, actually,” he said. “Since about the end of 2013, we’ve seen a number of higher lows develop. And what that means is that the stock is being revalued higher. The market is rewarding that

value and paying higher prices.” Keurig Green Mountain’s breakout above \$124 per share on Friday was significant, according to Pytlar. “Since February, people weren’t willing to pay more than \$124,” “In technical terms, that’s usually **a very bullish indication**. It usually means there’s **plenty of more upside**, and we think that the stock can **continue to run**.”

Appendix B. A comprehensive list of all data sources and assets featured in “Talking Numbers”

This appendix presents the data source for all assets and a detailed list of the asset themselves. The stock return and trading volume figures are from the Center of Research in Security Prices (CRSP). The firm accounting variables are from COMPUSTAT. The earnings surprises as well as analysts’ consensus mean and standard deviation are from I/B/E/S. Thomson-Reuters Institutional Holdings (13F) Database provides institutional holdings, and Insider Filings (Form 4) Database captures changes in ownership of corporate insiders. The Fama–French (1993) and momentum factors, used to risk-adjust investment returns, are provided by Kenneth R. French’s library. The stock indexes covered by “Talking Numbers” are provided by the S&P Dow Jones Indexes, NASDAQ OMX Global Indexes, Nikkei, Moscow Exchange, Bucharest Stock Exchange, and International Securities Exchange (Homebuilders Index). The prices of precious metals are provided by the London Bullion Market Association. The natural gas prices are from the U.S. Energy Information Administration (EIA). The copper prices are provided by the New York Mercantile Exchange, the agriculture prices are from CME Group and Intercontinental Exchange (ICE) and the source for the CRB Index is Thomson Reuters. All the other commodity prices are from the Federal Reserve Bank of St. Louis.

The interest rates are provided by the Federal Reserve Bank of St. Louis. The 90-day Treasury bill rate serves as a proxy for the risk-free rate. To measure the performance of 10-year Treasuries recommendations, we employed two methods. First, the ten-year Treasury Constant Maturity Rates were used to calculate the price of a notional zero-coupon 10-year bond. Second, we employed the price of the iShares 7–10 Year Treasury Bond ETF. As the empirical evidence for the two methods is similar, we report the findings for the first approach. Below is the full list of all assets organized in groups according to their type.

U.S. market

S&P 500, NYSE COMPOSITE INDEX;

Equity sectors and non-U.S. equity indexes

Sectors

S&P100, DOW INDUSTRIAL, DOW UTILITIES, DOW TRANSPORTS, NASDAQ COMPOSITE, NASDAQ 100, RUSSEL2000, GUGGENHEIM SHIPPING ETF (SEA), KBW BANK INDEX (BKX), PHLX HOUSING SECTOR INDEX (HGX), MSCI REIT INDEX (RMZ), ALERIAN MLP (AML), GOLD MINERS ETF (GDX), JUNIOR GOLD MINER ETF (GDXJ), BROKER DEALERS ETF (IAI), ISHARE NASDAQ BIOTECH (IBB), RUSSELS 2000 ETF (IWM), ISHARE US REAL ESTATE ETF (IYR), ISHARE DJ TRANSPORTATION AVR (IYT), SPDR KBW REG BANKING (KRE), S&P400 MICAP (MDY), OIL SERVICE HOLDERS (OIH), MARKET VECTORS RETAILS (RTH), ISE HOMEBUILDERS INDEX (RUF), MARKET VECTORS STEAL (SLX), SOCIAL MEDIA ETF (SOCL), VANGUARD REIT (VNQ), NYSE ARCA AIRLINE INDEX (XAL), S&P AEROSPACE DEFENCE (XAR), SPDR S&P HOMEBUILDERSA (XHB), ENERGY SPDR (XLE), SPDR FINANCIAL ETF (XLF), INDUSTRIAL SELECT SECTOR SPDR (XLI), TECHNOLOGY SPDR (XLK), CONSUMER STAPLE SPDR (XLP), UTILITIES SPDR ETF (XLU), HEALTH CARE SECTOR SPDR ETF (XLV), CONSUMER DICRTIONARY (XLY), SPDR S&P MTL&MNG ETF (XME), SPDR S&P RETAIL (XRT), ISHARE DJ US HOME (ITB)

Non-U.S. index

NIKKEI 225, SHANGHAI COMPOSITE, S&P BSE SENSEX, ISHARE MSCI INDIA ETF (INDA), HANG SANG, NIGERIA ETF (NGE), ROMENIA BET, VIETNAM ETF (VNM), WISDOMTREE (DXJ), ISHARES MSCI EMERGING MARKETS (EEM), ISHARES MSCI MEXICO (EWW), ISHARE MSCI BRAZIL (EWZ), ISHARE FTSE CHINA 25 (FXI), MARKET VECTORS RUSSIA (RSX), RTS MOSCOW (RTS), ISHARE MSCI TURKEY ETF (TUR), VANGUARD MSCI EUROPE (VGK)

U.S. Stocks

ALCOA (AA), AUTO PARTS (AAP), APPLE (AAPL), ABBOT LABRATORIES (ABT), AUTOMATIC DATA PROCESSING (ADP), AMERICAN EAGLE (AEO), AFLAC (AFL), AIG (AIG), ALLSTATE (ALL), ADVANCED MICRO (AMD), AMGEN (AMGN), AMZON (AMZN), AUTONATION (AN), ABERCROMBIE & FITCH (ANF), AOL (AOL), APACH (APA), ANADARKO PETROLEUM (APC), APPOLO GROUP (APOL), AEROPOSTALE (ARO), ATHENAHEALTH (ATHN), ACTIVISION BLIZZARD (ATVI), AMERICAN EXPRESS (AXP), ASTRAZENCA(AZN), AUTOZON (AZO), BOEING (BA), BANK OF AMERICA (BAC), BED BATH & BEYOND (BBBY), BLACKBERRY (BBRY), BEST BUY (BBY), BARCLAS (BCS), SOTHBY'S (BID), BIOGEN IDEC (BIIB), BARNES & NOBLE (BKS), BURGER KING (BKW), BRISTOL MYERS (BMY), BRITISH PETROLIUM (BP), BUFFALO WILD WINGS (BWLD), CITI GROUP (C), CABELA'S (CAB), CONAGRA (CAG), CHEESECAKE FACTORY (CAKE), CATERPILLAR (CAT), CHUBB (CB), CBS CORP (CBS), CARNIVSAL (CCL), CHESAPEAKE ENERGY (CHK), CLIFF NATURAL (CLF), COLONY FINANCIAL (CLNY), COMCAST (CMCSA), CHIPOTLE (CMG), CABOT OIL AND GAS (COG), COACH(COH), CONOCOPHILLIPS (COP), COSTCO (COST), CAMELL SOUP (CPB), CARTER'S (CRI), SALESFORCE (CRM), CICO (CSCO), CINTAS (CTAS), CVS CAREMARK (CVS), CHEVRON (CVX), CEASARS (CZR), DOMINION RESOURCES (D), DELTA AIR LINES (DAL), DUPONT (DD), 3D SYSTEMS (DDD), DEERE (DE), DELL (DELL), DIAGEO (DEO), DOLLAR GENERAL (DG), D.R. HORTON (DHI), WALT DISNEY (DIS), DISH NETWORK (DISH), DUNKIN BRANDS (DNKN), DIMOND OFFSHORE (DO), DR PEPPER (DPS), DOMINO'S (DPZ), DARDEN RESTAURANT (DRI), DIRECTTV (DTV), DEVON ENERGY (DVN), DREAMWORKS (DWA), ELECTRONICS ART (EA), EBAY (EBAY), CONSOLIDATED EDISION (ED), ENTERPRISE PRODUCTS (EPD), EQUITY RESIDENTIAL (EQR), EXPEDIA (EXPE), FORD (F), FACEBOOK (FB), FREEPORT MCMORAN (FCX), FAMILY DOLLAR (FDO), FEDEX (FDX), FREDDIE MAC (FMCC), FREDDIE MAC (FNMA), FOSSIL GROUP (FOSL), TWENTY-FIRST CENTURY FOX (FOXA), FIRST SOLAR (FSLR), GENERAL DYNAMIC (GD), GENERAL ELECTRIC (GE), GILEAD SCIENCES (GILD), GENERAL MILLS (GIS), GENERAL MOTORS (GM), GREEN MOUNTAIN (GMCR), RANGOLD RESOURCES (GOLD), GOOGLE (GOOG), GOPRO (GPRO), GAP (GPS), GARMIN (GRMN), Groupon (GRPN), GOLDMAN SACHS (GS), HALLIBURTON (HAL), HOME DEPOT (HD), HEBALIFE (HLF), HRLEY-DAVIDSON (HOG), HOVNANIAN (HOV), HEWLETT PACKARD (HPQ), H&R BLOCK (HRB), HERTZ GLOBAL (HTZ), HUMANA (HUM), IBM (IBM), ICAHN ENTERPRISES (IEP), IMAX (IMAX), INTEL (INTC), INVENSENSE (INVN), INTUITIVE SERGICAL (ISRG), JETBLUE (JBLU), J.C. PENNEY (JCP), JOHNSON & JOHNSON (JNJ), JUNIPER NETWORKS (JNPR), JOS A BANK (JOSB), JPMORGAN (JPM), NORDSTROM (JWN), KB HOME (KBH), KRISPY KREME (KKD), COCA-COLA (KO), MICHAEL KORS (KORS), KANSAS CITY SOUTHERN (KSU), LYBERTY GLOBAL (LBTYA), LENNAR (LEN), LIONS GATE (LGF), LOCKHEED MARTIN (LMT), LINKEDIN (LNKD), LORILLARD INC (LO), LOWE'S (LOW), LUFKIN INDUSTRIES (LUFK), LULULEMON (LULU), SOUTHWEST AIRLINES (LUV), LAS VEGAS SANDS (LVS), MACY'S (M), MASTERCARD (MA), MACERICH (MAC), MATTEL (MAT), MCDONALD'S (MCD), KRAFT (KFT/MDLZ), MGM RESORTS (MGM), MONSTER BEVERAGE (MNST), ALTRIA (MO), MARATHON PETROLIUM (MPC), MERK (MRK), MORGAN STANLEY (MS), MICROSOFT (MSFT), MADISON SQUARE (MSG), MICRON TECHNOLOGY (MU), MURPHY OIL (MUR), NAVISTAR (NAV), NASDAQ OMX (NDAQ), NOODLES (NDLS), NEWMONT MINING (NEM), NETFLIX (NFLX), NICE SYSTEMS (NICE), NIKE (NKE), NOKIA (NOK), NORFOLK SOUTHERN (NSC), NUANCE COMM (NUAN), NYSE EURONEXT (NYX), OLD MOMINION FREIGHT (ODFL), OMNICOM GROUP (OMC), ORACLE (ORCL), OUTERWALL (OUTR), ORBITZ (OWW), OCCIDENTAL PETROLEUM (OXY), PANDORA (P), PRICELINE (PCLN), PEPSICO (PEP), PFRIZER (PFE), PROCTOR & GAMBLE (PG), PULTEGROUP (PHM), PVH (PVH), QUALCOMM (QCOM), ROYAL CARIBBEAN (RCL), ROYAL DUTCH SHELL (RDS-A), REVLON (REV), TRANSOCEAN (RIG), RALPH LAUREN (RL), REALIGY HOLDINGS (RLGY), ROSS STORES (ROST), SPRINT (S), STARBUCKS (SBUX), SOLARCITY (SCTY), SEAWORLD (SEAS), SEARS (SHLD), SHERWIN WILLIAMS (SHW), SIRIUS XM RADIO (SIRI), SIX FLAGS (SIX), SAKS (SKS), SKECHERS (SKX), SCHLUMBERGER (SLB), SANDISK (SNDK), SONY (SNE), SODASTREAM (SODA), SONIC (SONC), STAPLES (SPLS), CONSTELLATION (STZ), AT&T (T), MOLSON COORS (TAP), TASER INTERNATIONAL (TASR), TAUBMAN CENTERS (TCO), TARGET (TGT), TIFANY (TIF), TOYOTA (TM), TOLL BROTHERS (TOL), TRIPADVISOR (TRIP), TRINITY INDUSTRY (TRN), TRAVELERS (TRV), TESLA (TSLA), TESORA (TSO), TAKE TWO INTER (TTWO), TIME WARNER CABLE (TWC), TWITTER (TWTR), TIME WARNER (TWX), TEXAS INSTRUMENTS (TXN), UNDER ARMOUR (UA), UNITED CONTINENTAL (UAL), UBS (UBS), UNITED HEALTHCARE (UNH), ULTRA PETROLEUM (UPL), UNITED

PARCEL SERVICE (UPS), URBAN OUTFITTERS (URBN), USB (USB), UNITED TECHNOLOGIES (UTX), VISA (V), VIACOM INC (VIAB), VALERO ENERGY (VLO), VODAPHONE (VOD), VERIZON (VZ), WEBMD HEALTH (WBMD), WENDY'S (WEN), WELLS FARGO (WFC), WHOLE FOODS (WFM), ANTM (WLP), WAL-MART (WMT), WEINGARTEN REALITY INVESTORS (WRI), WORLD WRESTLING (WWE), WYNN RESORTS (WYNN), US STEAL (X), EXXON MOBIL (XOM), YELP (YELP), YAHOO (YHOO), YUM BRANDS (YUM), ZILLOW (Z), ZINGA (ZNGA)

U.S. Bonds

10-YR T-NOTE (iShares 7-10 Year Treasury Bond ETF -IEF (94US10Y)
ISHARE S&P NATIONAL MUNI (MUB)
BARCLAYS MUNI BOND (TFI)

Commodities

GOLD COMEX (GCZ4), SILVER COMEX (SIZ4), COPPER (HGZ4), NATURAL GAS (NGV14), PALLADIUM (PAL), BRENT CRUDE OIL (BRENT), RABOB GASOLINE (GASOLINE), WTI CRUDE OIL (WTI), CORN (CORN), ORANGE JUICE (ORNG), WHEAT (WHEAT), DEUTSCHE BANK COMMODITIES ETF (DBC), SPDR GOLD ETF (GLD), IPATH DJ-UBS COFFEE (JO), SILVER ETF (SLV), NATURAL GAS FUND (UNG), CRP INDEX

Others

VIX, RENAISSANCE IPO ETF (IPO), BITCOIN, NYC REAL ESTATE, LUXURY HOUSES, JUNK BONDS ETF, ALIBABA IPO, MORTGAGE RATES, DOLAR INDEX, YEN-DOLAR, DOLAR-EURO, DOLAR-RUPPY