Institutional Investors, Analysts' Recommendations, Annual Reports, Textual Analysis and Stock Returns: Evidence from SEC EDGAR 10-K and 13-F Forms

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Abstract

I analyze 18510 SEC EDGAR Form 10-K (annual reports), for NASDAQ, NYSE and AMEX (NYSE MKT) stocks, along with 176565 SEC EDGAR Form 13-F (quarterly reports of institutional investors holdings), and analysts' recommendations, from 2001 until 2015. I find that (i) 10-K pessimism negatively affects stock holdings *after* the filing, (ii) institutions do not appear to have forecasting power as to how pessimistic the annual report will be, as they do not adjust their holdings in the pessimistic stocks *before* the 10-K filing takes place, (iii) an increase in the number of institutional investors that hold a stock leads to an increase in stock prices after the 10-K filing (iv) institutions increase their positions in stocks that had positive returns one (1) to twelve (12) months before the 10-K filing (v) analysts' recommendations are affected by 10-K pessimism three (3) to nine (9) months *after* the 10-K filing, (vi) contrary to the cross-section of institutional investors, analysts do appear to have some forecasting power over how pessimistic the annual report will be, a few months *before* the 10-K filing month.

JEL classification: G10, G14, G23.

Keywords: SEC, EDGAR, Form 13-F, Form 10-K, Textual Analysis, NYSE, NASDAQ, AMEX (NYSE MKT).

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1. Introduction

Institutional investors are (supposedly) among the most sophisticated investors. According to the Securities and Exchange Act of 1934[1], institutional investment managers that "exercise investment discretion over $100 million or more"[2] are required to file 13F Forms within 45 days of every calendar quarter. According to the SEC website "Institutional investment managers can include investment advisers, banks, insurance companies, broker-dealers, pension funds, and corporations"[3]. Institutional managers report 13-F on a quarterly basis. In this paper, I perform textual analysis on 13-F filings Forms, where I count the number of institutions that hold every particular stock on their portfolios, for the intersection of NYSE, NASDAQ and AMEX stocks. I combine the holdings of institutions as reported to the 13-F forms, along with the annual reports of listed companies, as reported in their annual 10-K forms. 176565 13-F forms are analyzed, along with 18510 annual 10-K forms. To the best of my knowledge, this is the first paper to study the institutional trading behavior along with content analysis performed on corporate annual filings. The previous literature on textual analysis studies the very short term effects of Form 10-K content on stock prices a few days before and after the filing (Loughran and McDonald (2011)), or how previous prices and 10-K textual analysis pessimism affects stock prices in the months after the filing (Chouliaras (2015a)). There exists no previous paper to examine whether institutional investing affects (and is affected) by the tone that firms use in their annual reports. Institutional investors, being professionals who get paid for allocating resources in financial markets, have strong incentives to optimally (as much as possible) process available information, and to extract useful signals (if any) which might lead them to profitable decision making as far as their investments are concerned. Information processing can be very costly, and extracting the appropriate signals is not an easy exercise. Annual reports such as the Form 10-K, offer a great source of information to investors, since firms are by law obliged to provide "a comprehensive overview of the company's business and financial condition and includes audited financial statements"[4]. Indeed, as the findings of this article show, the coefficient between 10-K pessimism and the number

[1] http://www.sec.gov/divisions/investment/13flists.htm
[2] http://www.sec.gov/divisions/investment/13ffaq.htm
[3] http://www.sec.gov/answers/form13f.htm
[4] http://www.sec.gov/answers/form10k.htm

of institutions that hold every particular stock is negative, which means that institutions reduce their positions in firms which exhibit a pessimistic tone through their annual reports. On the other hand, institutional investors do not seem to be able to *forecast* the tone of the 10-K, which means they do not adjust their stock holdings *ex ante*, but only react to the new information *ex post*.

Nofsinger and Sias (1999) find a positive association between changes in institutional ownership and returns at the same period. Nofsinger and Sias (1999) and Lakonishok, Shleifer, and Vishny (1992) study the effects of "investor herding", defined as a group of investors trading in the same direction for some time period, and "feedback trading", defined as a correlation between "investor herding" and previous returns. The number of institutional investors that hold a particular stock can be viewed as "investor herding", especially in the occasion that a high number of institutions enter (or exit) this stock during the examined time period. Consistent with this evidence, I find that an increase in the number of institutions that hold a particular stock in the period one (1) to four (4) months before a 10-K filing, leads to an increase in the stock price two (2) to five (5) months after the 10-K filing, an effect which is short-lived since prices tend to fall two (2) to eleven (11) months after the filing, when the change in holdings is measured four (4) to ten (10) months before the 10-K filing takes place. Five (5), eight (8) and eleven (11) months after the 10-K filing, the number of institutions that hold a particular stock is much higher for stocks that had an increase in their prices in the previous period, which is evidence consistent with the findings that institutional investors by and large are momentum traders, buying stocks that performed nicely and selling stocks that performed badly in the period one (1) to twelve (12) months before the annual report filing (Grinblatt, Titman, and Wermers (1995)). On top of these findings, an aspect of this article that is completely unexamined in the previous literature is that I associate the institutional holdings to the actual content of the annual reports, while Nofsinger and Sias (1999) conjecture the possibility that "One path depicts individual investors as engaging in herding as a result of irrational, but systematic, responses to fads or sentiment. A second path depicts institutional investors engaging in herding as a result of agency problems, security characteristics, fads, or the manner in which information is impounded in the market". In this study, I quantify the content of Form 10-K, which can serve as a proxy for both of the previously mentioned paths. A 10-K

might indeed express a "sentiment" which can be characterised by some as irrational, while on the other hand it can contain some real information, in the sense that it provides a ground for managers to express their assessment for the past performance of the firm, and their concerns and ambitions for its future performance. 10-K is audited, and by law management is obliged to present the real facts to investors. The content of corporate forms is very significant, because insufficient disclosure can lead to increased litigation risk, which can reduce the market value of the corporation (Hanley and Hoberg (2012)).

Finally, I explore the effect of 10-K pessimism on analysts' recommendations (and vice-versa), an effect which was also not previously examined in the literature. I use two types of data to study analysts recommendations, both of which come from Bloomberg: first, I use the number of analysts which recommend to sell (buy) each stock, as well as the total number of analysts which provide estimates for each stock. Secondly, I use what Bloomberg calls *"BEst" Analyst Recommendation Consensus*, which is the average value of analysts' recommendations for this stock, and which takes values between 1 to 5, with higher (lower) values indicating more analysts recommending buying (selling) the stock. 10-K pessimism also affects analysts' recommendations, three (3) to nine (9) months after the 10-K filing. Interestingly enough, and in contrast to the cross-section of institutional investors, analysts do appear to have some forecasting power as to how pessimistic the content of the annual report will be, especially a few months before the 10-K filing.

2. Textual Analysis Literature

The field of textual analysis has attracted the researchers' interest rather recently with the advent of Data Mining and Sentiment Analysis techniques. The strong interest in this area has been demonstrated by the recent creation of companies and commercial products specialized in the production of financial sentiment (see e.g., RavenPack[5] and Thomson Reuters News Analytics[6]). As far as the finance literature is concerned, the pioneering work of Tetlock (2007) uses textual analysis (based on the Harvard psychosocial dictionary) of a Wall Street Journal column, and associates the content

[5] http://www.ravenpack.com/
[6] http://www.machinereadablenews.com/

of the news with the Dow Jones returns, using vector autoregressions (VARs). He finds that media pessimism has predictive power on market returns, while reversion effects occur and extreme absolute values of pessimism predict higher trading volumes. Loughran and McDonald (2011) develop finance-oriented word lists by fine-tuning the Harvard dictionary, and correlate textual analysis variables with 10-Ks filing returns, trading volume, volatility and other characteristics. Chouliaras (2015a) finds that monthly portfolios based on the product of annual pessimism change and the previous period returns generate returns in excess of previous winners/losers. Other studies report evidence of predictive power of stock message boards and major financial columns on volatility, returns and volume (Antweiler and Frank (2004) , Chen, De, Hu, and Hwang (2013)). The related literature also studies the effect of returns on media content Garcıa (2012), the effect of media content on returns during recessions and expansions Garcia (2013)), while a high level of similarity in firm-specific news is found to provoke higher trading aggressiveness of individual investors (Tetlock (2011)). Boudoukh, Feldman, Kogan, and Richardson (2013) find that news that can be identified and classified in certain categories have a higher impact on stock markets than unidentified news. The effect on news sentiment during the recent financial crises have been examined in Chouliaras and Grammatikos (2015) for a daily frequency, and in Chouliaras (2015b) for the high-frequency (intraday) stock market dynamics, and find that a higher news pessimism is associated with lower stock returns. Another area of research has been the field of corporate earnings, where Tetlock, Saar-Tsechansky, and Macskassy (2008) find that a higher percentage of negative words in news about specific firms predicts lower quarterly earnings. Furthermore, textual analysis has been used for the study of initial public offerings (IPOs). Loughran and McDonald (2013) find that higher uncertainty in filings affect first-day returns and ex post volatility, Jegadeesh and Wu (2013) give different weights on words based on the market reactions that they caused and Li (2010) studies the effect of forward-looking statements in corporate filings on future earnings and liquidity. Finally, Ahern and Sosyura (2014) show evidence of firms manipulating media coverage to achieve better returns during mergers and acquisitions negotiations.

3. The Data

3.1. The SEC Form 10-K data

In order to obtain the SEC Form 10-K data, I use a web crawler written in the Python programming language[7], to detect and download the available forms for every firm in the NYSE, NASDAQ and AMEX (NYSE MKT) stock markets, from 2001 until 2015. In order to download the filings for every firm, one needs to know the ticker of the firm and the central index key (CIK)[8] which is used by SEC EDGAR in order to identify firms in their database. The Form 10-K text files contain huge amounts of html elements, which I strip off using the BeautifulSoup Python library[9]. Furthermore, I notice that the text files also contain great amounts of binary-to-text encoding known as uuencoding[10]. These cover thousands of lines in the text files, and correspond to .xls (Excel files), .zip (Zipped files), .pdf (PDF files), .jpg and .png (both image files formats) that exist in the SEC EDGAR files. To remove these lines I use once more Python. One has to remove the .html and the uuencode lines before proceeding with the Natural Language Processing textual analysis, or else the number of words are artificially increased without any meaningful information, a fact which may distort results since the .html tags and the uuencoding do not contain any meaningful human-read or computer-read information which a parser can capture. The number of 10-Ks per month appears in Figure 1:

Insert Figure 1 here

As one can see from the figure, the number of 10-Ks is significantly higher in the month of March (over 11000 filings in total), followed by February (5525 filings) and April (1042 filings). All other months have less than 1000 filings, with an overall low for October with only 273 filings. According to the SEC website[11] the Form 10-K has to be filed at a maximum 60 days after the end of the fiscal year for filers that have $700 Million or more public float, 75 days for filers that have between $75 and

[7] `https://www.python.org/`
[8] http://www.sec.gov/edgar/searchedgar/cik.htm
[9] `http://www.crummy.com/software/BeautifulSoup/bs4/doc/`
[10] urlhttp://linux.die.net/man/1/uuencode
[11] http://www.sec.gov/answers/form10k.htm

$700 Million public float, and 90 days for filers that have $75 Million public float [12].

3.2. The SEC Form 13-F data

In order to obtain the SEC Form 13-F data, I download the SEC EDGAR master files[13] which contain paths to all the filings that SEC receives. To extract these files, I use the Perl programming language[14]. After these files are downloaded, I download (using Python) all the 13-F filings. In particular, I keep the 13F-HR filings, excluding the amendments and the notice filings which do not contain any significant information for our purposes, since they contain no holdings[15]. The number of 13-F filings appear in Table 1:

Insert Table 1 here

On average, there exist over 10 thousand (10000) 13-F filings per year. The trend is increasing throughout the years, consistent with the fact that financial markets in general increased in size throughout these years. The total number of 13-F Forms I process are 176565. To the best of my knowledge, this 13-F data sample is the highest number of institutional investors holdings filings to be processed in the literature.

The number of SEC Form 13-F filings per month appear in Figure 2:

Insert Figure 2 here

The message of this figure is clear. The highest number of filings appear in four months: February, May, August and November. For these months there are over 31 thousand (31000) 13-F filings for

[12] the deadline used to be 75 days for large filers before December 2006, but after December 15, 2006 it was changed to 60 days after the end of the fiscal year

[13] urlhttps://www.sec.gov/edgar/searchedgar/ftpusers.htm

[14] `https://www.perl.org/`

[15] `https://www.sec.gov/about/forms/form13f.pdf`

August and November, and over 35 thousand (35000) 13-F filings for February and May. Then, on the months of January, April, July and October, the number of 13-F filings is between 9730 and 11 thousand (11000). Which means that in the months of February, May, August and November there exist three times as many 13-F filings. These four months combined contain more than 130 thousand (130000) 13-F filings, which is almost 76% of the overall number of 13-F filings. Given the SEC general instructions for the Form 13-F, *" every Manager which exercises investment discretion with respect to accounts holding Section 13(f) securities, as defined in rule 13f-1(c), having an aggregate fair market value on the last trading day of any month of any calendar year of at least $100,000,000 shall file a report on Form 13F with the Commission within 45 days after the last day of such calendar year and within 45 days after the last day of each of the first three calendar quarters of the subsequent calendar year. "*[16]. It seems like the institutional managers are waiting for the last days of the 45 days deadline before they submit their filings. To further examine whether this is indeed the case, I plot the number of filings per day of the month. The results appear in Figure 3:

Insert Figure 3 here

Indeed, as one can clearly see, the vast majority of 13-F filings occur near the middle of the month, with around 100 thousand 13-F forms being filed between the 11th and the 15th of the month. This is a clear indication that institutional investors tend to wait until the very last days of the deadlines, and only then do they submit their filings. The reason why this happens is not clear: it could be that they do not want to disclose their positions until the very last moment, or that the informational cost of processing and preparing these filings leads them to make full use of the time given to them by the SEC.

[16] `https://www.sec.gov/about/forms/form13f.pdf`

3.3. Financial data

As far as the financial data are concerned, I use the Bloomberg database. I extract returns and accounting variables for all available New York Stock Exchange (NYSE), National Association of Securities Dealers Automated Quotations (NASDAQ) and NYSE MKT (formerly known as American Stock Exchange - AMEX) stock markets, from 2001 until 2015.

4. The Methodology

4.1. Combining the 10-K and the financial data

As a first step, I have to combine the financial data from Bloomberg with the 10-K data I obtain from SEC EDGAR. To do this, I use the company names, tickers and central index keys (CIK), and match for every year and every stock index the companies with the appropriate Form 10-K.

4.2. Combining the 13-F filings with the 10-K and the financial data

After the 10-K and financial data matching is completed, I move on in order to attach the 13-F institutional holdings. To do so, I go through every 13-F filing, using software code written in Python. This code goes through every line of every 13-F filing, and obtains all the filings that are associated with holdings in companies. The 13-F forms come in text (.txt) files. The format of these files is not constant throughout time.

From 2013 and onwards, the format used by SEC is based on an Extensible Markup Language (XML) format[17]. The format that SEC uses[18],[19] appears in Figure 4:

Insert Figure 4 here

In such filings, the extraction is easier, because one can obtain the holdings from tags such as *"< nameOfIssuer >"*. For the filings before 2013, the holdings are mentioned inside a section of

[17] `http://www.w3.org/XML/`
[18] `https://www.sec.gov/info/edgar/edgarlinkonlinexml.htm`
[19] `http://www.sec.gov/info/edgar.shtml`

13-F forms contain the holdings of the particular institutional investor, inside an html table, which follows the line " $< TABLE >$ ". An example of such a filing appears in Figure 5:

Insert Figure 5 here

As one sees from Figure 5, After the " $< TABLE >$ " line, a line which contains the tag "NAME OF ISSUER" follows, after which the filings follow, until the line " $< /TABLE >$ " is found, a line which ends the holdings table for this 13-F. Our 10-K data are on a yearly basis, while our financial data are on a monthly basis. The 13-F filings contain the exact date on which they were filed, from which I can easily extract the year, month and day of every filing. Then, I am able to identify firms that are contained in this institutional investor's holdings. For every year, every firm and every month (subject to data availability), I create a counter which stands for the number of institutional investors that hold this particular stock on this point in time. This counter, stands for the institutional investors holdings. Since the 13-F forms contain the *long* positions of institutional investors, an increase in the number of institutions that hold a stock can be considered an increase of interest in this stock, i.e. some factor led this particular institutional investor to buy this stock, while a decrease in the number of institutional investors that hold a particular stock, can be considered as a decrease of interest in this stock. A higher (lower) number of institutional investors that hold a particular stock can be considered as an overall increase (decrease) in the interest in this stock by institutional investors in this stock. Of course a factor that is associated with institutional holdings is whether this stock belongs in an index, on which institutions passively invest, but one has to take into account the existence of active managers which rebalance their portfolios on a more frequent basis.

4.3. Textual Analysis

As a next step, using textual analysis, based on the Loughran and McDonald (2011) dictionary[20], I measure the positive content of 10-Ks as in Garcıa (2012) and Garcia (2013): $G_i = \sum_i \frac{g_i}{w_i}$, calculated

[20]The dictionary can be found at `http://www3.nd.edu/~mcdonald/Word_Lists.html`

as the percentage of positive words over the total number of words of every 10-K filing. The symbol g_i stands for the number of positive words in the filing, and w_i stands for the total number of words in the filing. I do not count stop words, which are words that are very common and do not really add sentiment to the text. Words such as country names, words such as *a, about, after, again, all, almost, an, and, are, become, can, does, either, elsewhere, has, if, it, is, like, less, often, only, that, they, together, was* and thousands of other words are neglected since they do not offer some significant content in terms of sentiment analysis[21]. Using a regular expression in Python[22], I am able to count only words, excluding numbers, special characters et cetera, which do not provide any textual significance for our sentiment analysis. I do the same for the negative words, obtaining the negative media content as $B_t = \sum_i \frac{b_t}{w_t}$, with b_i denoting the negative words in the filing. Thus, I obtain the *Pessimism* of filing i:

$$Pessimism_i = B_i - G_i \tag{1}$$

The *Pessimism* is calculated for every filing.

The summary statistics of the combination between 10-Ks and financial data appear in Table 2:

Insert Table 2 here

I calculate log-returns for stocks (in this case, the prices are always the ones in the end of every month. The data are annual, which means that the mean yearly return is 6.2%. Furthermore, I calculate the percentage change in pessimism from one year's 10-K to the following year, as well as the percentage of positive and negative words in 10-K filings. I find that the average 10-K has 0.7% positive words, 1.4% negative words, which means 0.7% more negative than positive words (i.e. an average pessimism of 0.7%), while the yearly average pessimism change is 2.5%. I also find that 10-Ks on average have 74796 words.

[21]The stop words can be found at: `http://www3.nd.edu/~mcdonald/Word_Lists.html`
[22]`https://docs.python.org/2/library/re.html`

5. Research Hypothesis and Empirical Results

For all the models I employ in this article, I use Panel Data models, with firm fixed effects, year fixed effects, and firm clustered standard errors, which allow for intragroup correlation. This allows me to relax the requirement that the observations be independent.

5.1. Does 10-K pessimism change affect 13-F institutional holdings changes?

As a first research question, I examine whether annual reports textual pessimism, as expressed by the content analysis of SEC EDGAR Form 10-Ks, significantly affects the number of institutions that hold the specific stock. To be able to study this, the following model is employed:

$$\Delta Holdings_{t-1,t+T} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Pessimism_{t-12,t} \quad (2)$$

t is the time of the current 10-K filing, t-1 is one month before the current filing, $\Delta Holdings_{t-1,t+T}$ stands for the change in the number of institutional investors that hold each stock, two (2), five (5), eight (8) and eleven (11) months after the filing, $\Delta Pessimism_{t-12,t}$ stands for the change in 10-K pessimism between the current and the previous 10-K filing. Given the fact that the vast majority of 10-K filings are made on March, and the vast majority of 13-F filings are made on February, May, August and November, we focus on these months in our analysis. Equation 2 studies whether the change in pessimism affects the number of institutions that hold every particular stock. The results appear in Table 3:

Insert Table 3 here

As one can see, the coefficients start to become negative from five months after the 10-K submission and on. For the seven months from month 5 up to month 11, all three coefficients are significant. In all cases, the significant coefficients are negative, which means that a positive pessimism change (i.e. a higher pessimism in this year's 10-K versus the previous year) leads to a decrease in the number

of institutions that hold this stock. Five months after the 10-K submission, a one percent higher pessimism leads to a decrease to the number of institutions that hold this stock by 0.788%, with a highly significant t-statistic (at the level of 1%), equal to -2.81. Eight (8) months after the 10-K filing, the coefficient is once more significant, equal to -0.602 (t-stat equal to -1.96), which means that a 1% increase in 10-K pessimism leads to -0.602% less institutions holding the stock. Eleven (11) months after the 10-K filing, the effect of textual analysis pessimism on the number of institutions that hold this particular stock is once more statistically significant (with a coefficient -1.457, and a t-statistic equal to -3.25), which means that a 1% increase in the annual report's pessimism, is associated with 1.457% less institutions holding this stock.

The only coefficient that is not statistically significant is the coefficient of two (2) months after the 10-K filing. This is mainly due to the reporting lag between trading and filing. The filings that are classified as $t+2$ may very well indeed correspond to the period before the 10-K filing took place. One can verify that by reading the SEC guidelings[23] and see the data element: "CONFORMED PERIOD OF REPORT". This is an optional data element, which mentions the end date of the reporting period of filing. For example, the 13-F filing of "Goldman Sachs Group Inc" that was filed on the date 20150515 (15 May 2015 - which happens to be the last day of the 45 days window that is allowed by the SEC guidelines), as seen by the "FILED AS OF DATE" tag, actually corresponds to the 20150331 date (31 March 2015) as far as trading is concerned, as seen by the "CONFORMED PERIOD OF REPORT"[24]. So, if company X filed a 10-K annual report in March, Goldman Sachs could have bought (or sold) stocks in April, May, and June. The next conformed period of report is 20150631, and then they have another 45 days, which means that the earliest date on which investors can learn whether Goldman Sachs bought, sold, or kept the same amount of stock X will be in August 15 2015 (if Goldman Sachs makes full use of the 45 days window which they seem to be doing). If indeed Goldman Sachs (or another institutional investor) sold their stocks in company X because it was too pessimistic, the first significant coefficient would be in August, which is the coefficient t+5, indeed the

[23] `https://www.sec.gov/info/edgar/pdsdissemspec051310.pdf`

[24] the full text of the Goldman Sachs May 2015 13-F filing can be found at `https://www.sec.gov/Archives/edgar/data/886982/000076999315000653/0000769993-15-000653.txt`

first significant coefficient we get.

The number of 10-K filings per day of the month appear in Figure 6:

Insert Figure 6 here

As one can see, there are two "spikes" as far as the number of 10-K filings are concerned: one in the middle of the month (days 15 and 16), and one towards the end of the month (days 27 and 28). For such filings, the institutional investors have only a few days to trade and report these tradings. Only if they did so, would the coefficient of t+2 be significant. This does not seem to be the case, which can either be attributed to their inability to process the 10-K content so rapidly, or that these trades are reported in the report of the next period (t+5).

5.2. Are institutions able to forecast 10-K pessimism changes by adjusting their 13-F institutional holdings?

A natural question that emerges as a follow up possibility to the analysis of section 5.1, is whether institutional investors are able to forecast the tone of 10-K filings, and to adjust their positions accordingly. To study this question, I employ the following model:

$$\Delta Pessimism_{t-12,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Holdings_{t-1,t+T} \tag{3}$$

The symbols are the same as employed previously in Equation 2. The logic of this model is to study the change in holdings *before* the current 10-K is released. If institutions have a some kind of superior knowledge to the average investor, one should expect to find some significant holdings changes *prior* to the release of the annual report. The results of this analysis appear in Table 4:

Insert Table 4 here

No coefficient is significant. In other words, the cross section of institutional investors does not

appear to be able to forecast how pessimistic the content of the forthcoming annual report will be, and thus are not able to adjust their portfolio holdings on the pessimistic stocks. As the results of Section 3 shows, institutions adjust their positions based on the 10-K tone *after* the filing takes place, but as the results of Table 4 show, they are not able to do so *before* the 10-K filing. From this, one can draw the conclusion that indeed the 10-K content analysis contain significant and new information, which is not available and known by the cross-section of institutional investors *ex ante*, since they are only able to respond *ex post*.

5.3. Do changes in 13-F institutional holdings affect stock returns?

In this section, I examine whether changes in institutional holdings, as expressed through the number of institutions that hold a particular stock, affect stock returns in the future. To examine this, I employ the following model:

$$Return_{t+T,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Holdings_{t,t-T_1} \tag{4}$$

where $Return_{t+T,t}$ stands for the stock return between months t and t+T, with T taking values 1 to 12, while $\Delta Holdings_{t,t-T_1}$ stands for the change in the number of institutional investors holding the particular stocks, once more for months 1 to 12. The results appear in Tables 5 and 6:

Insert Tables 5 and 6 here

As one sees from Table 5, a positive change in holdings between one and four months before the 10-K filing, leads to positive stock returns two (2) and five (5) months after the filing. The coefficients are significant, both in terms of magnitude (0.237 and 0.0585 for the two and five months), and in terms of statistical significance (3.24 and 4.31 for the t-statistics). An increase of 1 percent in the number of institutions in the 1 to 4 months before 10-K filing period, leads to a 0.0237% increase in its stock return two months after the 10-K filing, which increases to 0.0585% five months after the filing. This finding indicates that there institutions seem to profit (in the short run) from stocks that

they buy. Nevertheless, the effect seems to be a short one, since Table 6 shows a negative coefficient between stock returns for stocks that were owned by more institutions when the change in holdings is defined between four (4) and seven (7) or ten (10) months before the filing. An increase in holdings of 1 percent four (4) to seven (7) months before the 10-K filing, leads to a *decrease* of -0.0367% in stock returns two (2) months after the filing (with a t-stat equal to -4.03), a number which becomes -0.0611% five (5) months after the 10-K filing (with a t-stat equal to -4.62).

It could be that either institutions increase their holdings in stocks which return positively in the short run (2 to 5 months) and negatively in the longer run (7 to 10 months), or simply that they buy stocks which return positively in the short run and which they sell after this short period of profits. This is perhaps a question to be answered in follow-up research.

5.4. Do stock returns affect 13-F institutional holdings?

A question that naturally follows is how do changes in stock returns before the 10-K filings affect the holdings in the following months? To study this question, I swap the dependent and the independent variables of the model in Equation 4, which leads to the following model:

$$\Delta Holdings_{t+T,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Price_{t-T,t} \tag{5}$$

Five months after the filing, the results appear in Table 7 show:

Insert Table 7 here

Five months after the filing, all coefficients are positive, which means that institutions buy previous winners. All five coefficients are positive, and highly statistically significant (the lowest t-statistic is 4.75, and the highest is 7.59).

The results for the period eight months after the filing appear in Table 8:

Insert Table 8 here

Once more, all five (5) coefficients are positive and statistically significant, which means that stocks that performed better in the previous one (1) to twelve (12) months before the 10-K filing, are held by a larger number of institutions, eight (8) months after the 10-K filing. The coefficients vary from 0.232 (t-stat equal to 7.60) for the change in price one month before the 10-K filing, up to 0.0987 (t-stat equal to 6.37) for the change in price three (3) months before the 10-K filing. These coefficients mean that a one percent (1%) increase in the stock price one (1) month (six months) before the filing, leads to a 0.232% (0.0865%) higher number of institutional investors holding this stock eight (8) months after the 10-K filing.

The results for the period eleven months after the filing appear in Table 9:

Insert Table 9 here

Once more, all five (5) coefficients are significant both in a statistical and an economic sense. As one sees from the results of Tables 7, 8 and 9 a positive return in the period one (1) to twelve (12) months before the 10-K filing leads to an increase in the number of institutions that hold this stock.

5.5. Does 10-K pessimism affect analysts recommendations?

For every stock (subject to data availability), Bloomberg provides the number of analysts that recommend selling the stock i at time t ($Sell_{i,t}$), the number of analysts that recommend buying the stock i at time t ($Buy_{i,t}$), as well as the total number of analysts that provide forecasts for stock i at time t ($Analysts_{i,t}$). Using this information, I create a variable that is the number of analysts suggesting selling the stock, minus the number of analysts suggesting buying the stock, divided by the

total number of analysts covering the stock:

$$Sell - Buy_{i,t} = \frac{Sell_{i,t} - Buy_{i,t}}{Analysts_{i,t}} \tag{6}$$

If $Sell - Buy_{i,t}$ becomes higher, this means that the number of analysts that recommend selling stock i at time t become higher compared to the number of analysts that recommend buying stock i at time t. Naturally, if $Sell - Buy_{i,t}$ gets lower values, it is evidence that more analysts are recommending buying the stock than selling it.

A second metric that Bloomberg uses is called BEst Analyst Recommendation Consensus ($BEst_{i,t}$, with BEst standing for Bloomberg Estimates). The $BEst_{i,t}$ estimate is created by converting each of the analysts' current recommendations into a number from 1 to 5, and taking the average. Five (5) is the highest possible value for $BEst_{i,t}$, representing a buy signal, while one (1) is the lowest value for $BEst_{i,t}$, representing a sell signal. To study whether 10-K pessimism has an effect on the two variables for analysts' recommendations, namely the $Sell - Buy_{i,t}$ percentage and the $BEst_{i,t}$, I estimate the models of Equations 7 and 8, for $Sell - Buy_{i,t}$ and $BEst_{i,t}$ respectively:

$$Sell - Buy_{i,t+T} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Pessimism_{t-12,t} \tag{7}$$

$$BEst_{i,t+T} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Pessimism_{t-12,t} \tag{8}$$

In Equations 7 and 8, t is the month of the 10-K filing (I use March since it is the month that most 10-K filings take place). T takes values 3, 6, 8 and 9, which means I am studying the evolution of the $Sell - Buy$ percentage and the $BEst_{i,t}$ analysts' recommendation index through time. Since t is March, T concerns the months of June (t+3), September (t+6), November (t+8) and December (t+9). The results of these models appear in Table 10 (Panels A and B respectively):

Insert Table 10 here

As one sees from Table 10 (Panel A), all four coefficients are statistically significant (and positive). This means that a higher pessimism is associated with higher $Sell - Buy_{i,t+T}$, i.e. more analysts that recommend selling than buying the stock. A 1 percent (1%) increase in pessimism is associated 1.38%, 1.7%, 1.76% and 1.52% more analysts recommending selling the stock, nine (9), eight (8), six (6) and three (3) months after the 10-K filing (for 10-K filings that take place in March) respectively. As far as the $BEst_{i,t}$ metric is concerned, all four coefficients are once more significant, and negative. The difference in the sign is normal, since an increase in 10-K pessimism is associated with a lower value for $BEst_{i,t}$, which means analysts are less confident for companies that are more pessimistic this year than the previous year. Already three months after the filing (on month June), the coefficient is significant, with a company exhibiting an increase in 10-K pessimism of one percent (1%), having a $BEst_{i,t}$ rating which is lower by 0.0394 (t-stat equal to -2.21), which becomes 0.0450, 0.0487 and 0.0430 six (6), eight (8) and nine (9) months after the 10-K filing (t-stats equal to -2.29, -2.44 and -2.16 respectively).

5.6. Do analysts recommendations affect 10-K pessimism?

As we saw in Section 5.2, institutions are not able to forecast changes in 10-K pessimism. Is this the case for analysts as well? Or do analysts have some kind of "forecasting" power as to how pessimistic the annual report will be? To study these effects, I use the two metrics defined in Section 5.5, $Sell - Buy_{i,t}$ and $BEst_{i,t}$, and estimate the models of Equations 9 and 10:

$$\Delta Pessimism_{t-12,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 Sell - Buy_{i,t-T} \tag{9}$$

$$\Delta Pessimism_{t-12,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 BEst_{i,t-T} \tag{10}$$

In this case, the percentage difference of the number of analysts recommending selling the stock, versus the number of analysts recommending buying the stock ($Sell - Buy_{i,t-T}$), is measured three

(3), four (4), six (6) and nine (9) months before the 10-K filing (using the 10-K filings that take place in March, the analysts' recommendations correspond to months December, November, September and June of the previous year). The same applies to $BEst_{i,t-T}$, which takes the values of the BEst Bloomberg Analyst Recommendation Consensus three (3), four (4), six (6) and nine (9) months before the 10-K filing. The results of Equations 9 and 10 appear in Table 11 (Panels A and B respectively):

Insert Table 11 here

Quite interestingly, two of the four coefficients are significant for the $Sell - Buy_{i,t-T}$ percentage (Panel A). These are the two coefficients which are closer to March (the month where most 10-K filings take place): November and December, which are four (4) and three (3) months away from March, respectively. The November coefficient is less statistically significant (at the 10% level) than the December coefficient (5% level), while the December coefficient is also higher in magnitude (0.0992) than the November coefficient (0.0713). A one percent (1%) more analysts recommending selling stock i at November (compared to the number of analysts that recommend buying the stock), is associated with a 0.0713% higher 10-K textual pessimism in the forthcoming annual report in March, while the same increase in the December $Sell - Buy_{i,t-T}$ percentage is associated with a 0.0992 higher 10-K pessimism in the annual report of March. On the other hand, one of the four coefficients is significant for the $BEst_{i,t-T}$ rating. Once more the significant coefficient is the one that is closer to the 10-K filing of March (the coefficient of December, three months before the 10-K filing). Although only one coefficient of $BEst_{i,t-T}$ is significant, it is significant in the 1% level (t-stat of -2.59), while the $Sell - Buy_{i,t-T}$ were at best significant at the 5% level.

From both of these metrics, it seems like, in contract to the cross-section of institutional investors (see the results of Section 5.2), analysts do appear to have some forecasting power over how pessimistic the content of the annual report (Form 10-K) will be, which becomes stronger as we get closer to the filing month.

6. Conclusion

Analyzing a sample of 18510 SEC EDGAR Form 10-K (annual reports), for listed companies on NASDAQ, NYSE and AMEX (NYSE MKT), from 1999 until 2015, along with 176565 SEC EDGAR Form 13-F (quarterly reports of institutional investors holdings), I examine three entities: SEC EDGAR 10-K Forms pessimism as a product of textual analysis performed on the content of 10-Ks, along with stock prices and institutional investors holdings obtained from SEC EDGAR 13-F Forms. The main findings of this article are: (i) 10-K pessimism affects stock holdings *after* the filing takes place, in the sense that institutions reduce their positions (i.e. sell stocks) for companies that exhibit a positive pessimism change, i.e. for firms that have a higher pessimism this year when compared to the pessimism of the 10-K filed on the previous year, (ii) the cross-section of institutions does not appear to have forecasting power as to how pessimistic the content of the annual report will be, as they do not adjust their holdings in the pessimistic stocks *before* the 10-K filing takes place, (iii) an increase in institutional holdings provides (measured as the difference in the number of institutional investors that hold a particular stock) leads to an increase in stock prices two (2) to five (5) months after the 10-K filing, which does not survive in the long run (in some cases returns become negative eight (8) to eleven (11) months after the filing) and when the change in the number of institutions that hold the stock are defined four (4), seven (7) and ten (10) months before the filing, (iv) institutions increase their positions in stocks that performed nicely one (1) to twelve (12) months before the 10-K filing when the change in holdings is measured five (5), eight (8) and eleven (11) months after the 10-K filing, while they seem to reduce their positions in previous winners when the change in holdings is measured two (2) months after the 10-K filing, (v) analysts' recommendations are affected by 10-K pessimism three (3) to nine (9) months *after* the 10-K filing, (vi) in contrast to the cross-section of institutional investors, analysts do appear to have some forecasting power over how pessimistic the annual report will be, especially as we get closer to the filing month.

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Table 1: The table shows the total number of filings per year and on March. The number of filings corresponds the number of SEC Form 10-K filings matched with financial data from Bloomberg using the central index key (CIK) as a common identifier. The selected stocks correspond to all available (on Bloomberg) NYSE, NASDAQ and AMEX (NYSE MKT) stocks.

Year	**Number of 10-K filings**	**10-K Filings on March**	**Number of 13-F filings**
1999	196	131	5079
2000	209	141	7428
2001	955	514	8180
2002	1104	598	8212
2003	1195	777	8416
2004	1271	814	8821
2005	1343	871	9550
2006	1391	878	10418
2007	1411	710	11301
2008	1153	399	12299
2009	1258	509	11996
2010	1158	437	11687
2011	1132	405	12630
2012	1906	794	13246
2013	1201	400	13829
2014	1627	645	15239
2015	1458	778	8234
Total	18510	9801	176565

Fig. 1. Number of 10-K filings per month. March appears to be the month of the most filings, as mentioned also in Figure 7. Over 10,000 10-Ks were filed on Marches, followed by 4896 filed on Februaries, and only 904 on Aprils.

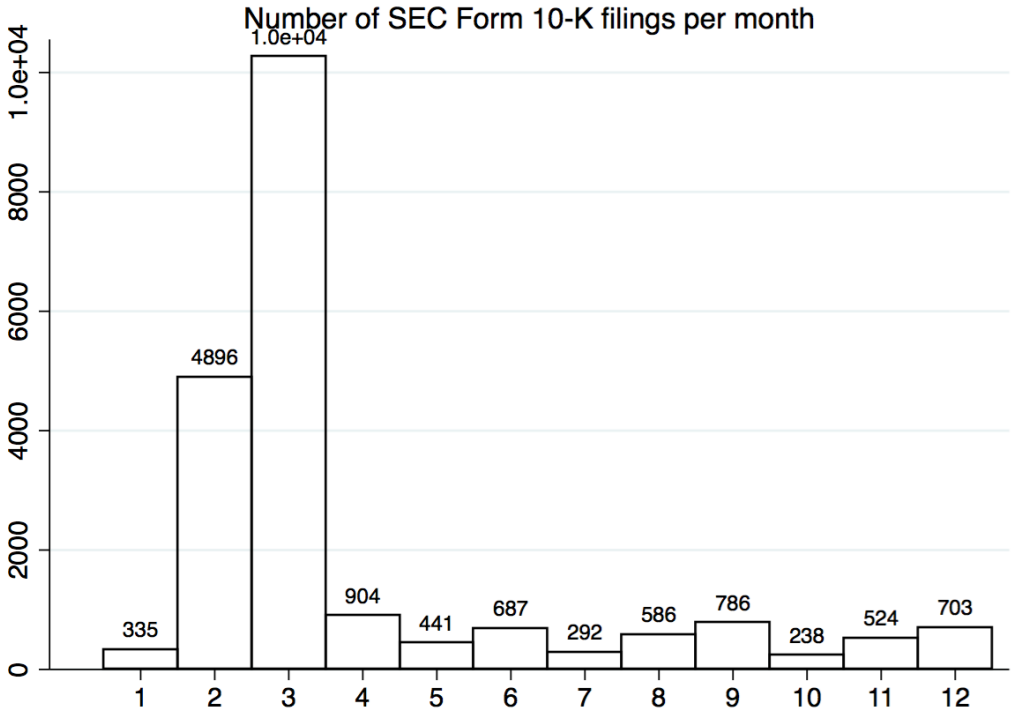

Fig. 2. Number of 13-F filings per month. There seem to be four "spikes" as far as the number of 13-F filings are concerned: in February, May, August and November. Given the fact that institutional investors have 45 days after the end of every quarter in order to submit their 13-F institutional holdings filings, filings in February most probably correspond to trading between October and December, May filings correspond to trading between January and March, August filings correspond to trading between April and June, and November filings correspond to trading between July and October.

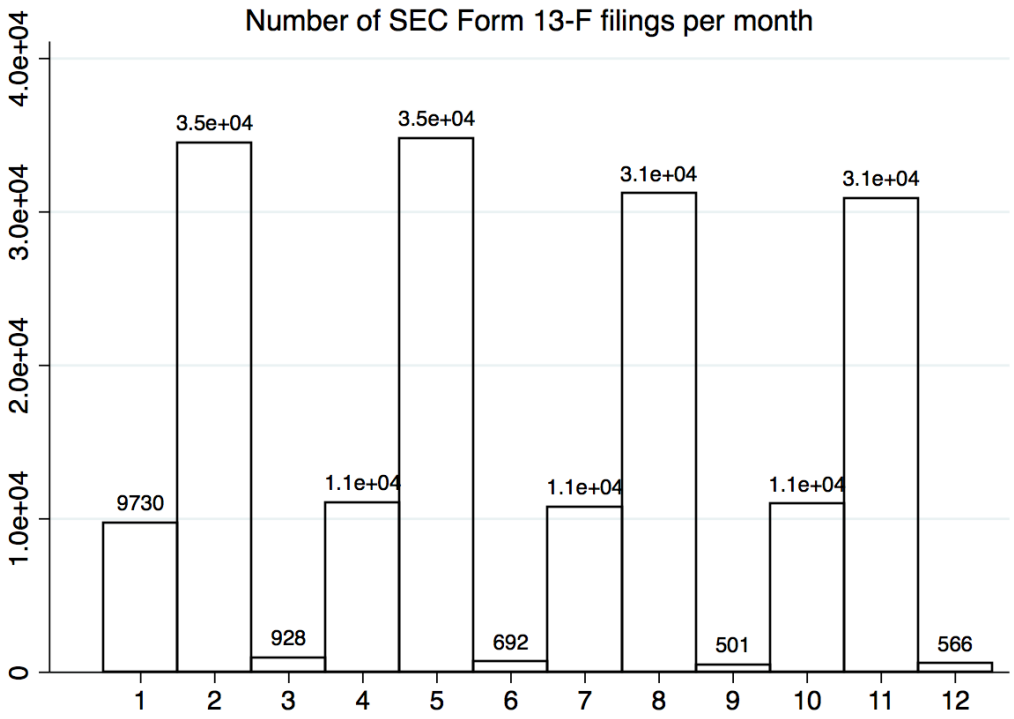

Fig. 3. Number of 13-F filings per day of the month. There is a clear "spike" in day 14 of the month. Given the fact that institutional investors have 45 days after the end of every quarter in order to submit their 13-F institutional holdings filings, it seems to be the case that most of them make full use of all the available days, either because of the information processing cost of these filings, or because they do not wish to disclose their positions earlier, for reasons that could be related to competition or other reasons.

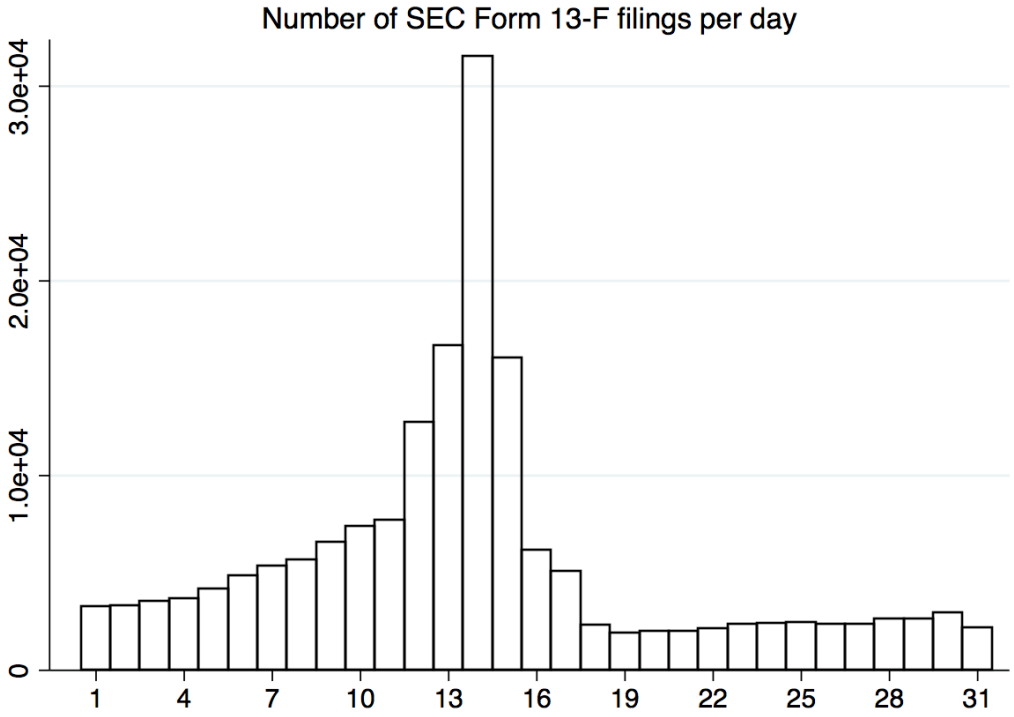

Fig. 4. The XML format that SEC uses for 13-F filings since 2013. This is part of a SEC EDGAR Form 13-F filing, filed on 14 November 2013 by Goldman Sachs Group Inc. The full filing can be found at `https://www.sec.gov/Archives/edgar/data/886982/000076999313000515/0000769993-13-000515.txt`. Before 2013, institutional investors used an HTML format, as the one that appears in Figure 5

Listing 1: SEC XML format for Form 13-F

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<SEQUENCE>2
<FILENAME>f13f201303.xml
<TEXT>
<XML>
<?xml version="1.0" encoding="UTF-8"?>
<informationTable xmlns="http://www.sec.gov/edgar/document/thirteenf/informationtable"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
        <infoTable>
                <nameOfIssuer>1 800 FLOWERS COM</nameOfIssuer>
                <titleOfClass>CMN</titleOfClass>
                <cusip>68243Q106</cusip>
                <value>730</value>
                <shrsOrPrnAmt>
                        <sshPrnamt>148024</sshPrnamt>
                        <sshPrnamtType>SH</sshPrnamtType>
                </shrsOrPrnAmt>
                <investmentDiscretion>DFND</investmentDiscretion>
                <otherManager>1</otherManager>
                <votingAuthority>
                        <Sole>148024</Sole>
                        <Shared>0</Shared>
                        <None>0</None>
                </votingAuthority>
        </infoTable>
        <infoTable>
                <nameOfIssuer>1ST SOURCE CORP</nameOfIssuer>
                <titleOfClass>CMN</titleOfClass>
                <cusip>336901103</cusip>
                <value>1798</value>
                <shrsOrPrnAmt>
                        <sshPrnamt>66789</sshPrnamt>
                        <sshPrnamtType>SH</sshPrnamtType>
                </shrsOrPrnAmt>
                <investmentDiscretion>DFND</investmentDiscretion>
                <otherManager>1</otherManager>
                <votingAuthority>
                        <Sole>66789</Sole>
                        <Shared>0</Shared>
                        <None>0</None>
                </votingAuthority>
        </infoTable>
        </informationTable>
</XML>
</TEXT>
</DOCUMENT>
</SEC-DOCUMENT>
```

Fig. 5. The XML format that SEC uses for 13-F filings before 2013. This is a part of a SEC EDGAR Form 13-F filing, filed on 14 November 2012 by Goldman Sachs Group Inc. The full filing can be found at `https://www.sec.gov/Archives/edgar/data/886982/000076999312000619/0000769993-12-000619.txt`. Since 2013, the format used by institutional investors is an XML format, as the one that appears in Figure 4.

Listing 2: HTML format for Form 13-F filings before 2013

```
<TABLE>
                                          FORM 13F
                                      INFORMATION TABLE

                                                                                            PAGE 1
ITEM1                          ITEM2 ITEM3    ITEM4       ITEM5           ITEM6 ITEM7            ITEM8

                                                 FAIR                                     VOTING AUTHORITY
                               TITLE           MARKET  SHARES OR SH/ PUT/ Inv Other
NAME OF ISSUER                 OF    CUSIP      VALUE  PRINCIPAL PRN CAL Dscr Mana-   SOLE    SHARED    NONE
                               CLASS NUMBER   (x\$1000)   AMOUNT (A) (B) (C)  gers    (A)       (B)       (C)
- ---------------------------------------------------------------------------------------------------------
<S>                            <C> <C>        <C>         <C>        <C> <C> <C>  <C> <C>       <C>      <C>
1 800 FLOWERS COM          CMN 68243Q106       530.85     142,319 SH     SH-DEF 1       142,319         0         0
1ST SOURCE CORP            CMN 336901103        1,813      81,410 SH     SH-DEF 1        81,410         0         0
1ST SOURCE CORP            CMN 336901103       837.89      37,624 SH     SH-DEF 2        37,624         0         0
1ST UNITED BANCORP INC FLA CMN 33740N105        79.38      12,307 SH     SH-DEF 1        12,307         0         0
3-D SYS CORP DEL           CMN 88554D205     1,303.72      39,687 SH     SH-DEF 1        37,687         0     2,000
3-D SYS CORP DEL           CMN 88554D205     3,935.43     119,800 SH PUT SH-DEF 1       119,800         0         0
3-D SYS CORP DEL           CMN 88554D205      1,093.9      33,300 SH CAL SH-DEF 1        33,300         0         0
3-D SYS CORP DEL           CMN 88554D205       436.64      13,292 SH     SH-DEF 2        13,292         0         0
3M CO                      CMN 88579Y101   213,480.57   2,309,896 SH     SH-DEF 1     2,248,058         0    61,838
3M CO                      CMN 88579Y101       46,210     500,000 SH PUT SH-DEF 1       500,000         0         0
3M CO                      CMN 88579Y101     54,065.7     585,000 SH CAL SH-DEF 1       585,000         0         0
3M CO                      CMN 88579Y101     41,230.5     446,121 SH     SH-DEF 2       446,121         0         0
3M CO                      CMN 88579Y101     7,065.97      76,455 SH     SH-DEF 7        76,455         0         0
8X8 INC NEW                CMN 282914100        223.2      34,025 SH     SH-DEF 1        34,025         0         0
A H BELO CORP              CMN 001282102        171.1      35,424 SH     SH-DEF 1        35,424         0         0
A123 SYS INC               CMN 03739T108       184.61     738,430 SH     SH-DEF 1       738,430         0         0
A123 SYS INC               CNV 03739TAA6        1,400   4,000,000 PRN    SH-DEF 1     4,000,000         0         0
A123 SYS INC               CMN 03739T108        35.62     142,500 SH PUT SH-DEF 1       142,500         0         0
A123 SYS INC               CMN 03739T108         28.9     115,619 SH     SH-DEF 7       115,619         0         0
AAON INC                   CMN 000360206     2,446.62     124,257 SH     SH-DEF 1       124,257         0         0
AAR CORP                   CMN 000361105      3,837.9     233,733 SH     SH-DEF 1       233,733         0         0
AAR CORP                   CNV 000361AH8        50.87      51,000 PRN    SH-DEF 1        51,000         0         0
AAR CORP                   CNV 000361AK1           24      25,000 PRN    SH-DEF 1        25,000         0         0
AAR CORP                   CMN 000361105     9,687.36     589,973 SH     SH-DEF 2       551,421         0    38,552
AARONS INC                 CMN 002535300    19,215.92     690,972 SH     SH-DEF 2       647,226         0    43,745
</TABLE>
</TEXT>
</DOCUMENT>
</SEC-DOCUMENT>
```

Fig. 6. Number of 10-K filings per day of the month. There seem to be two spikes, on in the middle of the month (1044, 1165 and 1191 filings on days 14, 15, 16 respectively) and on close to the end of the month (1062, 1304, 1496 filings on days 26, 27, 28 respectively). This is expected since companies have between 60 and 90 days after the fiscal year end to file their 10-K annual report, as explained in Section 3.1

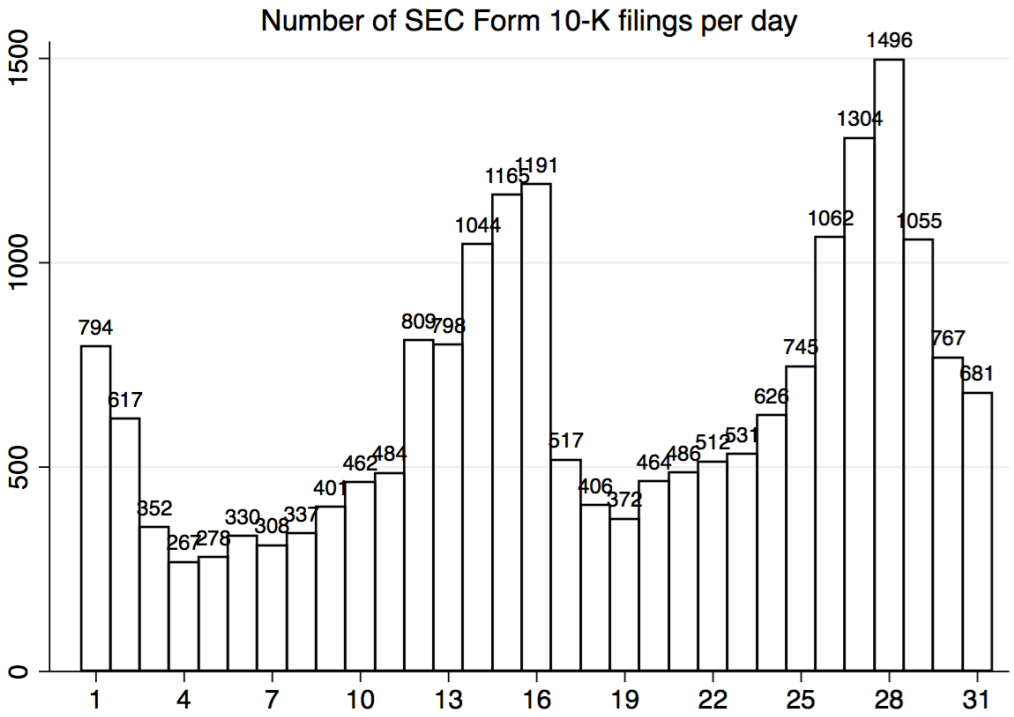

Fig. 7. Graphical illustration of Table 1. There is an increasing availability of data starting from 2000. Most of the 10-K Forms appear to be filed on March.

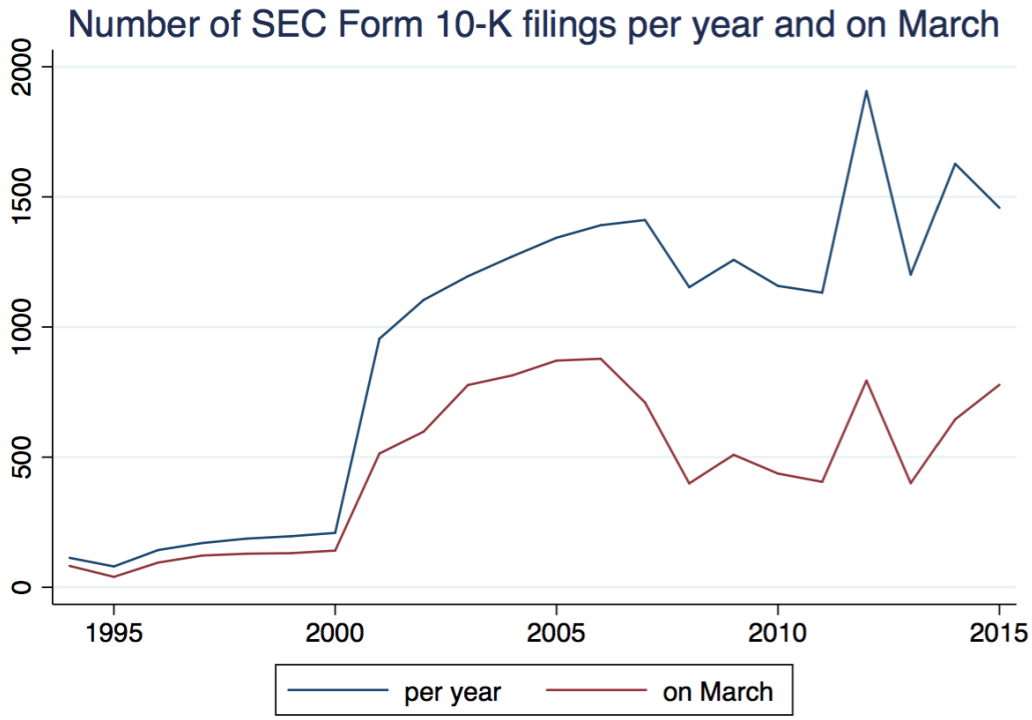

Fig. 8. Number of 13-F filings per year. The number of 13-F filings has an increasing trend. The drop in the number of 13-F filings in 2015 is due to the fact that my data end on June 2015.

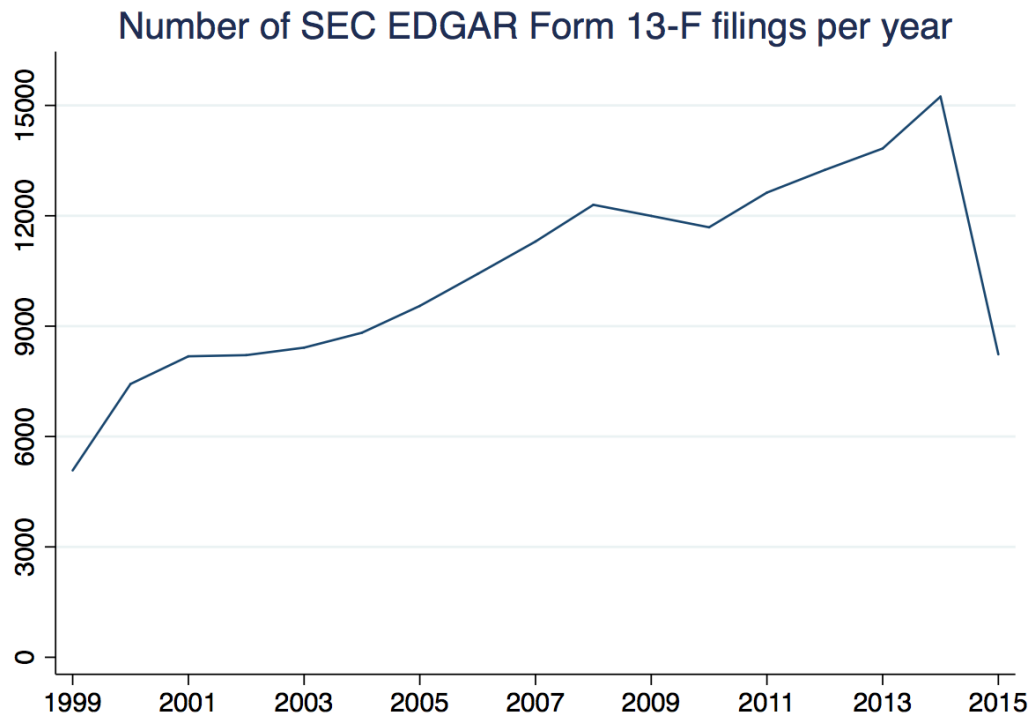

Table 2: Summary statistics table. T stands for the previous submission month while t stands for the current submission month. $\Delta Pessimism_{t-12,t}$ measures the change in pessimism between the previous Form 10-K filing (t-12) and the current filing (t). $Return_{t,t-1}$ captures the return between the end of the filing month and the previous month. $Return_{t+1,t}$ captures the return between one month after submission minus the submission month. Similarly I calculate $Return_{t+3,t}$, $Return_{t+6,t}$, $Return_{t+9,t}$, $Return_{t+12,t}$ for the returns 3, 6, 9 and 12 months after submission. I always get the price at the end of the submission month, in order to avoid dealing with the short-term effects that were studied in the previous literature. Finally, I calculate the percentage of positive words (Positive$_t$), negative words Negative$_t$, pessimism Pessimism$_t$ using the Loughran and McDonald (2011) word lists, and the summary statistics for the total number of words $Words_t$at each Form 10-K filing. Selected stocks are all available (on Bloomberg) NYSE, NASDAQ and AMEX (NYSE MKT) stocks from 2001 to 2015. Holdings January stands for the average number of institutional investors that hold each particular stock on the January filings, Holdings February for the February filings, et cetera for all twelve (12) months of the year. The 13-F filings of February, May, August and November are significantly more than the other months, which is also reflected on the amount of holdings reported on these months.

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
$Return_{t,t-1}$	0.01	0.128	-1.241	1.989	19757
$Return_{t+1,t}$	0.012	0.153	-1.688	3.482	19933
$Return_{t+3,t}$	0.018	0.247	-2.241	2.938	19544
$Return_{t+6,t}$	0.006	0.349	-2.69	3.466	19193
$Return_{t+9,t}$	0.022	0.41	-3.149	4.025	15794
$Return_{t+12,t}$	0.044	0.441	-3.394	3.156	16005
$\Delta Pessimism_{t-12,t}$	0.025	0.690	-6.736	5.285	14698
Positive$_t$	0.007	0.002	0	0.02	20661
Negative$_t$	0.014	0.005	0	0.217	20661
Pessimism$_t$	0.007	0.006	-0.013	0.212	20661
$Words_t$	74796.751	66134.272	122	747663	20661
Holdings January	24.045	30.814	1	302	23441
Holdings February	79.131	94.318	1	907	24583
Holdings March	2.71	3.838	1	44	12220
Holdings April	23.166	35.447	1	446	22728
Holdings May	81.039	93.482	1	855	24440
Holdings June	2.183	2.162	1	24	9636
Holdings July	21.849	32.993	1	351	21223
Holdings August	80.376	91.616	1	800	22675
Holdings September	2.031	1.789	1	22	5317
Holdings October	22.254	33.885	1	366	21277
Holdings November	80.708	91.128	1	800	22805
Holdings December	2.394	2.463	1	39	7913

Table 3: 10-K pessimism and 13-F filings holdings, two (2), five (5), eight (8) and eleven (11) months after the filing, for 10-K filings on March. The results of this table correspond to the following model (Equation 2), which examines whether a change in 10-K pessimism between the current and the previous filing (quantified using textual sentiment analysis which is applied on annual SEC EDGAR Form 10-K filings as explained in Section 4.3), affects the number of institutional investors that hold this particular stock (extracted using textual analysis from quarterly SEC EDGAR Form 13-F, as described in Section 4.2. T takes the values 2, 5, 8 and 11, which corresponds to the holdings of months February, May, August, November, which are the months with the most 13-F filings. The 10-K filings are the ones that were filed in March, which consist the vast majority of 10-K filings. t-1 stands for one month before the 10-K filing, which is the month February, since we consider the 10-K filings which take place in March.

$$\Delta Holdings_{t-1,t+T} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Pessimism_{t-12,t}$$

	(1) $\Delta Holdings_{t-1,t+2}$	(2) $\Delta Holdings_{t-1,t+5}$	(3) $\Delta Holdings_{t-1,t+8}$	(4) $\Delta Holdings_{t-1,t+11}$
$\ln PB$	-0.0277**	-0.0189**	0.0283***	0.140***
	(-2.48)	(-2.03)	(3.11)	(6.82)
$\ln MarketCap$	-0.0247**	0.00716	0.0153	-0.0434**
	(-2.18)	(0.77)	(1.44)	(-2.42)
$\Delta Pessimism_{t,t-12}$	-0.413	-0.788***	-0.602**	-1.457***
	(-1.17)	(-2.81)	(-1.96)	(-3.25)
Constant	0.450**	-0.258	-0.285	0.907***
	(2.05)	(-1.41)	(-1.37)	(2.61)
R-squared	0.129	0.118	0.0703	0.157
N	7593	7080	7097	6415
Fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Std. errors clustering by firm	Yes	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: 10-K pessimism and 13-F filings holdings change, defined as the change in institutional investors holdings between four (4), seven (7) and ten (10) months after the 10-K filing, for 10-K filings on March. The results of this table correspond to the following model (Equation 3), which examines whether a change in holdings in the period before the 10-K filing (number of institutional investors that hold this particular stock (extracted using textual analysis from quarterly SEC EDGAR Form 13-F, as described in Section 4.2:) affects the 10-K pessimism (quantified using textual sentiment analysis applied on annual SEC EDGAR Form 10-K filings as explained in Section 4.3)

$$\Delta Pessimism_{t-12,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Holdings_{t-1,t+T}$$

	(1) $\Delta Pessimism_{t,t-12}$	(2) $\Delta Pessimism_{t,t-12}$	(3) $\Delta Pessimism_{t,t-12}$	(4) $\Delta Pessimism_{t,t-12}$	(5) $\Delta Pessimism_{t,t-12}$
$\ln PB$	-0.000354**	-0.000313*	-0.000337*	-0.000285	-0.000285
	(-1.97)	(-1.74)	(-1.84)	(-1.62)	(-1.62)
$\ln MarketCap$	0.0000887	0.0000747	0.0000778	0.0000565	0.0000565
	(0.56)	(0.47)	(0.48)	(0.35)	(0.35)
$\Delta Holdings_{t-1,t-4}$	0.000159				
	(1.01)				
$\Delta Holdings_{t-1,t-7}$		0.0000525			
		(0.37)			
$\Delta Holdings_{t-1,t-10}$			0.0000508		
			(0.45)		
$\Delta Holdings_{t-4,t-7}$				-0.0000778	
				(-0.41)	
$\Delta Holdings_{t-4,t-10}$					-0.0000778
					(-0.41)
Constant	-0.000731	-0.000479	-0.000496	-0.000119	-0.000119
	(-0.24)	(-0.15)	(-0.16)	(-0.04)	(-0.04)
R-squared	0.0886	0.0883	0.0887	0.0893	0.0893
N	7497	7442	7392	7519	7519
Fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Std. errors clustering by firm	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Stock returns and 13-F filings holdings change, defined as the change in institutional investors holdings between four (4), seven (7) and ten (10) months after the 10-K filing, for 10-K filings on March. The results of this table correspond to the following model (Equation 3), which examines whether a change in holdings in the period before the 10-K filing (number of institutional investors that hold this particular stock (extracted using textual analysis from quarterly SEC EDGAR Form 13-F, as described in Section 4.2:) affects stock returns two (2), five (5), eight (8) and eleven (11) months after the filing.

$$Return_{t+T,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Holdings_{t,t-T_1}$$

	(1) $\Delta Price_{t,t+2}$	(2) $\Delta Price_{t,t+5}$	(3) $\Delta Price_{t,t+8}$	(4) $\Delta Price_{t,t+11}$
$\ln PB$	0.0412***	0.135***	0.254***	0.283***
	(5.02)	(7.27)	(6.89)	(7.65)
$\ln MarketCap$	0.0236***	0.0582***	0.0991***	0.00495
	(3.22)	(4.28)	(4.13)	(0.19)
$\Delta Holdings_{t-1,t-4}$	0.0183***	0.0303***	0.0148	-0.0000430
	(2.61)	(2.70)	(0.79)	(-0.00)
Constant	-0.533***	-1.507***	-2.288***	-0.620
	(-3.72)	(-5.74)	(-5.17)	(-1.26)
R-squared	0.262	0.374	0.439	0.425
N	7497	7497	4389	6334
	(1) $\Delta Price_{t,t+2}$	(2) $\Delta Price_{t,t+5}$	(3) $\Delta Price_{t,t+8}$	(4) $\Delta Price_{t,t+11}$
$\ln PB$	0.0437***	0.140***	0.262***	0.290***
	(5.14)	(7.31)	(6.87)	(7.61)
$\ln MarketCap$	0.0232***	0.0580***	0.0990***	0.00422
	(3.08)	(4.15)	(4.01)	(0.16)
$\Delta Holdings_{t-1,t-7}$	-0.00192	-0.00127	-0.0281*	-0.0482***
	(-0.29)	(-0.12)	(-1.79)	(-2.90)
Constant	-0.522***	-1.495***	-2.267***	-0.584
	(-3.55)	(-5.55)	(-4.99)	(-1.15)
R-squared	0.261	0.373	0.442	0.428
N	7442	7442	4356	6298
	(1) $\Delta Price_{t,t+2}$	(2) $\Delta Price_{t,t+5}$	(3) $\Delta Price_{t,t+8}$	(4) $\Delta Price_{t,t+11}$
$\ln PB$	0.0424***	0.137***	0.259***	0.284***
	(5.07)	(7.27)	(6.83)	(7.60)
$\ln MarketCap$	0.0250***	0.0630***	0.103***	0.00937
	(3.38)	(4.62)	(4.23)	(0.36)
$\Delta Holdings_{t-1,t-10}$	-0.00836*	-0.0118*	-0.0322***	-0.0420***
	(-1.72)	(-1.66)	(-2.64)	(-3.23)
Constant	-0.555***	-1.591***	-2.344***	-0.684
	(-3.84)	(-6.03)	(-5.23)	(-1.37)
R-squared	0.261	0.373	0.443	0.427
N	7392	7392	4310	6257
Fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Std. errors clustering by firm	Yes	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: (Continued from Table 4) Stock returns and 13-F filings holdings change, defined as the change in institutional investors holdings between four (4), seven (7) and ten (10) months after the 10-K filing, for 10-K filings on March. The results of this table correspond to the following model (Equation 3), which examines whether a change in holdings in the period before the 10-K filing (number of institutional investors that hold this particular stock (extracted using textual analysis from quarterly SEC EDGAR Form 13-F, as described in Section 4.2:) affects stock returns two (2), five (5), eight (8) and eleven (11) months after the filing.

$$Return_{t+T,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Holdings_{t,t-T_1}$$

	(1) $\Delta Price_{t,t+2}$	(2) $\Delta Price_{t,t+5}$	(3) $\Delta Price_{t,t+8}$	(4) $\Delta Price_{t,t+11}$
$\ln PB$	0.0420***	0.138***	0.259***	0.285***
	(4.98)	(7.34)	(6.93)	(7.66)
$\ln MarketCap$	0.0249***	0.0600***	0.101***	0.00595
	(3.35)	(4.32)	(4.12)	(0.23)
$\Delta Holdings_{t-4,t-7}$	-0.0368***	-0.0611***	-0.0992***	-0.105***
	(-4.03)	(-4.62)	(-4.93)	(-4.93)
Constant	-0.546***	-1.519***	-2.300***	-0.618
	(-3.76)	(-5.67)	(-5.09)	(-1.24)
R-squared	0.264	0.376	0.448	0.429
N	7519	7519	4393	6363
	(1) $\Delta Price_{t,t+2}$	(2) $\Delta Price_{t,t+5}$	(3) $\Delta Price_{t,t+8}$	(4) $\Delta Price_{t,t+11}$
$\ln PB$	0.0420***	0.138***	0.259***	0.285***
	(4.98)	(7.34)	(6.93)	(7.66)
$\ln MarketCap$	0.0249***	0.0600***	0.101***	0.00595
	(3.35)	(4.32)	(4.12)	(0.23)
$\Delta Holdings_{t-4,t-10}$	-0.0368***	-0.0611***	-0.0992***	-0.105***
	(-4.03)	(-4.62)	(-4.93)	(-4.93)
Constant	-0.546***	-1.519***	-2.300***	-0.618
	(-3.76)	(-5.67)	(-5.09)	(-1.24)
R-squared	0.264	0.376	0.448	0.429
N	7519	7519	4393	6363
	(1) $\Delta Price_{t,t+2}$	(2) $\Delta Price_{t,t+5}$	(3) $\Delta Price_{t,t+8}$	(4) $\Delta Price_{t,t+11}$
$\ln PB$	0.0426***	0.138***	0.257***	0.282***
	(5.07)	(7.31)	(6.86)	(7.60)
$\ln MarketCap$	0.0243***	0.0609***	0.101***	0.00722
	(3.29)	(4.44)	(4.15)	(0.28)
$\Delta Holdings_{t-7,t-10}$	-0.0117	-0.0225**	-0.0211	-0.0282
	(-1.49)	(-2.03)	(-1.23)	(-1.57)
Constant	-0.546***	-1.554***	-2.321***	-0.665
	(-3.78)	(-5.87)	(-5.18)	(-1.34)
R-squared	0.262	0.374	0.444	0.426
N	7464	7464	4354	6323
Fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Std. errors clustering by firm	Yes	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Stock returns and 13-F filings holdings change. The results of this table correspond to the following model (Equation 5), which examines whether a change in prices in the period one (1) to twelve (12) months before the 10-K filing affects the number of institutional investors that hold a particular stock, five (5) months after the 10-K filing.

$$\Delta Holdings_{t+T,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Price_{t-T,t}$$

	(1) $\Delta Holdings_{t-1,t+5}$	(2) $\Delta Holdings_{t-1,t+5}$	(3) $\Delta Holdings_{t-1,t+5}$	(4) $\Delta Holdings_{t-1,t+5}$	(5) $\Delta Holdings_{t-1,t+5}$
$\ln PB$	-0.0146*	-0.0234**	-0.0241**	-0.0263***	-0.0273***
	(-1.78)	(-2.49)	(-2.55)	(-2.73)	(-2.79)
$\ln MarketCap$	-0.000844	0.00794	0.00580	0.00357	-0.000992
	(-0.10)	(0.84)	(0.61)	(0.37)	(-0.10)
$\Delta Price_{t-1,t}$	0.0673**				
	(2.30)				
$\Delta Price_{t-3,t}$		0.0663***			
		(4.70)			
$\Delta Price_{t-6,t}$			0.0539***		
			(4.82)		
$\Delta Price_{t-9,t}$				0.0610***	
				(6.03)	
$\Delta Price_{t-12,t}$					0.0721***
					(7.57)
Constant	-0.0324	-0.271	-0.239	-0.182	-0.105
	(-0.19)	(-1.45)	(-1.27)	(-0.96)	(-0.55)
R-squared	0.113	0.121	0.121	0.124	0.130
N	9092	7080	7075	7068	7063
Fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Std. errors clustering by firm	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Stock returns and 13-F filings holdings change. The results of this table correspond to the following model (Equation 5), which examines whether a change in prices in the period one (1) to twelve (12) months before the 10-K filing affects the number of institutional investors that hold a particular stock, eight (8) months after the 10-K filing.

$$\Delta Holdings_{t+T,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Price_{t-T,t}$$

	(1) $\Delta Holdings_{t-1,t+8}$	(2) $\Delta Holdings_{t-1,t+8}$	(3) $\Delta Holdings_{t-1,t+8}$	(4) $\Delta Holdings_{t-1,t+8}$	(5) $\Delta Holdings_{t-1,t+8}$
$\ln PB$	0.0206**	0.0222**	0.0206**	0.0185**	0.0198**
	(2.41)	(2.46)	(2.30)	(2.07)	(2.19)
$\ln MarketCap$	0.0205**	0.0149	0.0113	0.00945	0.00769
	(2.35)	(1.41)	(1.07)	(0.90)	(0.73)
$\Delta Price_{t-1,t}$	0.232***				
	(7.60)				
$\Delta Price_{t-3,t}$		0.0987***			
		(6.37)			
$\Delta Price_{t-6,t}$			0.0865***		
			(7.44)		
$\Delta Price_{t-9,t}$				0.0844***	
				(8.26)	
$\Delta Price_{t-12,t}$					0.0706***
					(7.69)
Constant	-0.246	-0.274	-0.219	-0.162	-0.142
	(-1.43)	(-1.32)	(-1.06)	(-0.79)	(-0.69)
R-squared	0.0746	0.0779	0.0791	0.0824	0.0815
N	9124	7097	7092	7085	7080
Fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Std. errors clustering by firm	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Stock returns and 13-F filings holdings change. The results of this table correspond to the following model (Equation 5), which examines whether a change in prices in the period one (1) to twelve (12) months before the 10-K filing affects the number of institutional investors that hold a particular stock, eleven (11) months after the 10-K filing.

$$\Delta Holdings_{t+T,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Price_{t-T,t}$$

	(1) $\Delta Holdings_{t-1,t+11}$	(2) $\Delta Holdings_{t-1,t+11}$	(3) $\Delta Holdings_{t-1,t+11}$	(4) $\Delta Holdings_{t-1,t+11}$	(5) $\Delta Holdings_{t-1,t+11}$
$\ln PB$	0.138***	0.136***	0.135***	0.134***	0.137***
	(8.52)	(6.70)	(6.68)	(6.66)	(6.72)
$\ln MarketCap$	-0.0538***	-0.0444**	-0.0467***	-0.0470***	-0.0454**
	(-3.90)	(-2.52)	(-2.65)	(-2.66)	(-2.53)
$\Delta Price_{t-1,t}$	0.244***				
	(5.81)				
$\Delta Price_{t-3,t}$		0.0738***			
		(3.36)			
$\Delta Price_{t-6,t}$			0.0654***		
			(3.95)		
$\Delta Price_{t-9,t}$				0.0544***	
				(3.76)	
$\Delta Price_{t-12,t}$					0.0271**
					(2.02)
Constant	1.320***	0.928***	0.961***	0.981***	0.941***
	(4.92)	(2.72)	(2.81)	(2.85)	(2.70)
R-squared	0.166	0.158	0.159	0.159	0.157
N	7995	6415	6411	6405	6402
Fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Std. errors clustering by firm	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: 10-K pessimism annual change ($\Delta Pessimism_{t,t-12}$) to analysts' recommendations ($Sell - Buy_{i,t+T}$ and $BEst_{i,t-T}$), 3, 6, 8 and 9 months after the filing. The results of this table correspond to the following models (Equations 7 and 8), which examine whether a change in the 10-K Pessimism filing affects these two metrics of analysts' recommendations, as described in Section 5.5.

$$Sell - Buy_{i,t+T} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Pessimism_{t-12,t}$$

$$BEst_{i,t+T} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 \Delta Pessimism_{t-12,t}$$

	(1) $Sell - Buy_{i,t+3}$	(2) $Sell - Buy_{i,t+6}$	(3) $Sell - Buy_{i,t+8}$	(4) $Sell - Buy_{i,t+9}$
Panel A: 10-K $\Delta Pessimism_{t,t-12}$ to $Sell - Buy_{i,t+T}$, 3, 6, 8 and 9 months after the filing				
$\Delta Pessimism_{t,t-12}$	0.0138**	0.0170**	0.0176**	0.0152**
	(2.06)	(2.43)	(2.41)	(2.19)
$\ln PB$	-0.0521***	-0.0451***	-0.0297**	0.00331
	(-3.73)	(-3.29)	(-2.17)	(0.21)
$\ln MarketCap$	-0.114***	-0.123***	-0.127***	-0.129***
	(-6.90)	(-7.57)	(-7.88)	(-7.61)
Constant	1.964***	2.127***	2.176***	2.178***
	(6.08)	(6.72)	(6.89)	(6.59)
R-squared	0.0876	0.0906	0.0992	0.0966
N	4404	4397	4381	4341
Panel B: 10-K $\Delta Pessimism_{t,t-12}$ to $BEst_{i,t-T}$, 3, 6, 8 and 9 months after the filing				
	(1) $BEst_{i,t+9}$	(2) $BEst_{i,t+8}$	(3) $BEst_{i,t+6}$	(4) $BEst_{i,t+3}$
$\Delta Pessimism_{t,t-12}$	-0.0430**	-0.0487**	-0.0450**	-0.0394**
	(-2.16)	(-2.44)	(-2.29)	(-2.21)
$\ln PB$	0.139***	0.127***	0.0994***	0.0334
	(3.71)	(3.43)	(2.90)	(0.95)
$\ln MarketCap$	0.201***	0.219***	0.218***	0.238***
	(4.41)	(4.89)	(5.36)	(5.99)
Constant	-0.222	-0.568	-0.476	-0.778
	(-0.25)	(-0.65)	(-0.59)	(-1.00)
R-squared	0.0536	0.0571	0.0658	0.0729
N	4256	4242	4631	4576
Fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Std. errors clustering by firm	Yes	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Analysts' recommendations ($Sell - Buy_{i,t+T}$ and $BEst_{i,t-T}$) to 10-K pessimism annual change ($\Delta Pessimism_{t,t-12}$), 3, 4, 6 and 9 months before the filing. The results of this table correspond to the following models (Equations 9 and 10), which examine whether these two metrics of analysts' recommendations "forecast" a change in the 10-K Pessimism filing, as described in Section 5.6.

$$\Delta Pessimism_{t-12,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 Sell - Buy_{i,t-T}$$

$$\Delta Pessimism_{t-12,t} = \alpha_0 + \beta_0 \ln PB + \beta_1 \ln Market\,Cap + \beta_2 BEst_{i,t-T}$$

	(1) $\Delta Pessimism_{t,t-12}$	(2) $\Delta Pessimism_{t,t-12}$	(3) $\Delta Pessimism_{t,t-12}$	(4) $\Delta Pessimism_{t,t-12}$
Panel A: $Sell - Buy_{i,t-T}$ to 10-K $\Delta Pessimism_{t,t-12}$, 3, 4, 6 and 9 months before the filing				
$\ln PB$	-0.0200	-0.0138	-0.0107	-0.00981
	(-0.49)	(-0.32)	(-0.25)	(-0.22)
$\ln MarketCap$	0.0109	0.00465	0.00770	0.00506
	(0.32)	(0.13)	(0.21)	(0.13)
$Sell - Buy_{i,t-3}$	0.0992**			
	(2.42)			
$Sell - Buy_{i,t-4}$		0.0713*		
		(1.80)		
$Sell - Buy_{i,t-6}$			0.0326	
			(0.82)	
$Sell - Buy_{i,t-9}$				0.0332
				(0.77)
Constant	0.230	0.158	0.0733	0.123
	(0.33)	(0.23)	(0.11)	(0.18)
R-squared	0.175	0.182	0.182	0.182
N	4302	3813	3790	3753
Panel B: $BEst_{i,t-T}$ to 10-K $\Delta Pessimism_{t,t-12}$, 3, 4, 6 and 9 months before the filing				
	(1) $\Delta Pessimism_{t,t-12}$	(2) $\Delta Pessimism_{t,t-12}$	(3) $\Delta Pessimism_{t,t-12}$	(4) $\Delta Pessimism_{t,t-12}$
$\ln PB$	-0.0139	-0.0133	0.00496	-0.000766
	(-0.37)	(-0.30)	(0.13)	(-0.02)
$\ln MarketCap$	-0.00855	-0.00351	-0.0204	-0.00830
	(-0.28)	(-0.10)	(-0.63)	(-0.22)
$BEst_{i,t-3}$	-0.0341***			
	(-2.59)			
$BEst_{i,t-4}$		-0.0193		
		(-1.37)		
$BEst_{i,t-6}$			-0.0135	
			(-1.03)	
$BEst_{i,t-9}$				-0.0182
				(-1.11)
Constant	0.705	0.381	0.662	0.456
	(1.09)	(0.55)	(1.08)	(0.65)
R-squared	0.169	0.186	0.178	0.186
N	4555	3678	4053	3597
Fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Std. errors clustering by firm	Yes	Yes	Yes	Yes