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Informed Trading of Sell-Side Analysts: Evidence from Class Action Lawsuits

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ABSTRACT

This paper examines whether sell-side analyst-affiliated investors trade stocks before their analysts release material information. Using class action lawsuits, I explore the pre-lawsuit periods and investigate how potentially informed analysts trade their covered firms. The event study finds that analyst-affiliated investors reduce their stockholdings of firms prior to their own analyst downgrades. The findings are more pronounced among investors employed by investment banks. The post-trading performance of analyst-affiliated investors suggests that they have superior information and front-run to maximize benefits.

KEYWORDS

Sell-side analyst; front running; securities class action lawsuits

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1. Introduction

Sell-side analysts play an important role in disseminating information. They provide services of independent research to investors who make investment decisions accordingly. This paper, however, investigates the possibility of analysts' information sharing with affiliated institutional investors. Previous studies on the informed trading of institutional investors are broad (e.g., Park et al., 2014; Hwang, 2019). Specifically, institutions may trade analyst recommendations documents before the release of those analysts' recommendations (Hwang, 2021). Irvine et al. (2007) find that institutional trading volume, especially buying, is abnormally high because of tips received regarding the contents of forthcoming analysts' reports. Christophe et al. (2010) provide evidence of front-running by short-sellers, who are informed before downgrades. These findings suggest that analysts provide affiliated investors or clients tips in regard to future recommendation revisions so that they can exploit profitable opportunities.

In 2012, Goldman Sachs was fined $22 million for short-term stock tipping to its biggest trading clients, called "a dishonest and unethical violation" of the Massachusetts state securities act by Massachusetts regulators.[1] This practice was known as *trading huddles* between Goldman's stock analysts and traders. Sell-side analysts identified stocks that were likely to rise or fall due to earnings, firm-specific news, or macro environments. The trading huddles grew out of a 2003 settlement with regulators in which several Wall Street firms, including Goldman, agreed to pay a $1.4 billion settlement to resolve accusations that they had been issuing overly optimistic stock research to win more lucrative investment banking business. The settlement requires the financial firms to put up firewalls between research and investment banking and also stop the use of banking revenue to subsidize research. Consequently, Goldman management, seeking new ways to make money from research, introduced the idea of trading huddles and increased trading commissions in exchange for the trading ideas. Although this case indicates potential pre-release trading, little research has studied the overall magnitude and significance of institutional trading prior to analyst recommendations and its impact on other trading clients.

In this study, I examine the extent to which institutions benefit by trading on pre-release information and provide evidence of the trading huddles. Financial institutions with their own analysts have two major channels through which information collected among divisions is released. The investment arms (asset management or client accounts) reveal information through their trades, and in-house analysts release theirs with recommendations. My primary interest is to examine the trading activities of institutional investors along with their recommendations on firms sued for alleged financial fraud. Therefore, if an institution has affiliated analysts following a firm and the institution also invests in the firm's stocks, I classify it as a sell-side analyst investor (SAI).

To understand the effect of different levels of relationships with a covered firm, SAIs are further classified into four groups. First, U-SAIs are SAIs which have served as lead underwriters in the past three years for a covered firm. Michaely and Womack (1999) document a potential conflict of interest inherent in underwriter analysts. The lead underwriter is responsible for the due diligence process, for "building the book" of committed investors, for the debut price of IPOs or SEOs, and for the aftermarket price support. The recommendations from underwriter analysts and their trading behavior would not be the same as other analysts without such an intensive duty.

Second, L-SAIs are those who have had a lending relationship in the past three years with a covered firm. Corporate lending is another important activity of banks through which they may be able to collect information about their borrowers such as the firms' financial condition, creditworthiness, and even future performance. Massa and Rehman (2008) study how information flows within financial conglomerates by investigating loan market deals, providing evidence that affiliated asset management companies trade on shared inside information not available to the market.

The rest of the SAIs are considered independent SAIs. Their financial institutions are without any relationship with their covered firms. Among independent SAIs, those who work for investment banks may have different levels of information and trading activities relative to pure independent analysts who work for institutions such as brokerage houses as well as banks without investment banking. Jacob et al. (2008) compare the earnings forecasts of analysts employed by investment banks with those employed by firms not involved in investment banking and find a relation between forecast accuracy and investment banking and its informational advantages. I, thus, separately analyze independent investment bank analysts (*IB-SAIs*) from those analysts not employed by an investment banking operation (*NIB-SAIs*).

My sample consists of firms with alleged financial fraud during the class period, which marks the beginning and the end of wrongdoings. It provides a unique private information production period that allows us to look at divisional activities of SAIs and address questions regarding how they trade and report stock value during the period. Another reason I use firms with class action lawsuits is because analysts have an incentive to produce information and pre-release it due to the nature of potential large losses. Christophe et al. (2010) study short-selling prior to the release of analyst downgrades and show that pre-announcement abnormal short-selling is significantly related to the subsequent share price reaction to the downgrade. Clearly, the potential negative impact of a downward revision on stock price provides investors with a strong incentive to profit from pre-release trades.

[1] "Goldman Fined $22 Million Over Trading Huddles" by Susanne Craig, published by *The New York Times* on April 12, 2012.

This paper finds that SAIs tend to decrease their holdings in the covered firms before their own analysts issue downgrades, particularly among institutions with independent IB analysts who do not serve those firms in underwriting business. Lender SAIs appear to drop the firms and do not provide many revisions during the class periods. Underwriter SAIs, on average, do not sell prior to any downgrades unless they are the ones to provide the first downgrade. In such a case, they sell significantly during the information pre-release period. Evidence of front-running is robust to controls for firm characteristics including size and book-to-market, investment bank reputation, firm past performance, institutional ownership, and analyst consensus and coverage. Furthermore, I provide empirical results with the finer classification for post-recommendation stock performance, showing that stocks sold by underwriter analyst institutions and independent IB analysts perform poorly in the long run, suggesting their informational advantage and accuracy.

This paper contributes to the literature on institutional trading and analyst recommendations. Chan et al. (2009) explore how US financial firms trade relative to their own equity analyst recommendations, showing that the firm trades are consistent with their analysts' research and recommendations. However, they investigate institutional trading during the quarter of and after a recommendation. As they discuss, strategic trading or trading aimed at benefiting from subsequent retail client trades might occur before the recommendation release. Jordan et al. (2012) and Haushalter and Lowry (2011) also look at the quarter of recommendation and the quarter after release to investigate institutional trading with analyst recommendations. This paper complements the previous studies by showing empirical tests of the informed trading of SAIs for pre-release periods and strengthens the arguments on the informed trading.

Secondly, this study differs from the literature focusing on the market-making activity of investment banks. Juergens and Lindsey (2009) examine NASDAQ market makers' trading volume around analyst recommendation changes issued by an analyst at the same firm and find evidence of elevated sell volume at the recommending analyst's firm in the two days preceding a downgrade. However, I examine quarterly holding changes during the quarter prior to downgrade issuance. It is much earlier than the 2-day window and helps identify whether the trades occur way before other clients' trading activities.

Thirdly, I add clarity to the question on institutional trading along with information sharing and conflicts of interest. According to Mehran and Stulz (2007), information plays a critical role in transactions involving financial institutions, whose main business is related to reducing asymmetric information for their customers, for example, by certifying new security issuance or reporting analysts' opinions on a firm's investment value. Therefore, consideration of the reputation capital of financial institutions may eliminate our concerns of credibility (Chemmanur and Fulghieri, 1994). The findings, however, suggest that institutions tend to emphasize their own profits, not those of their retail investing customers, by trading with pre-release or privately obtained information and misleading their customers with optimistically biased recommendations in some cases.

The remainder of the paper is organized as follows. Section 2 describes the data and sample selection. Section 3 reports the empirical results. I present robustness tests in section 4. Section 5 concludes the paper.

2. Data

2.1. Data

I examine the informed trading of SAIs on firms with class action lawsuits. The Stanford Clearing house offers detailed information on federal securities fraud class litigation. There are 1,977 unique firms (2,286 filings), securities of which are traded on the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), and NASDAQ during our sample period, from 2000 to 2006. Sell-side analysts for each firm are obtained using I/B/E/S, while their affiliated investors are collected with the I/B/E/S Broker Translation file and through a hand-matching process.[2] Thomson Financial/Spectrum 13F data provides aggregate holdings at an institution level.[3]

I/B/E/S also provides analysts' recommendations. I obtain variables including the announcement dates of recommendations, reporting analysts, number of analysts following, brokerage houses employing the analysts, the level of the consensus recommendation as well as each analyst's recommendation. To identify lending relationships between financial institutions and analyst covered firms, I use the Loan Pricing Corporation's DealScan database, which contains identification of a lead arranger of each borrower's package loan deal. For stock performance information, the Center for Research in Security Prices (CRSP) is used for the stock price, return, and shares outstanding. I obtain accounting figures in financial statements from COMPUSTAT to see firms' financial characteristics such as total assets, book value, and leverage.

[2] The I/B/E/S Broker Translation file covers only up to 2006.

[3] Under the SEC Act of 1934, all institutional investors with security assets of $100 million or more under discretionary management are required to report their holdings each quarter on Form 13f.

2.2. Sample

I first identify the sued firms that are covered by sell-side analysts during the class period, which is specified in the lawsuit. Each lawsuit gives the class period starting date (CPS), the class period ending date (CPE), and the lawsuit filing date (LF). The CPS shows when the wrongdoing starts, and the CPE is the date at which that wrongdoing ends and is also uncovered. Figure 1 shows the timeline of the class period. The period from the CPS up until the release of the first downgrade (upgrade) provides an event window during which informed investors such as SAIs possibly make a profit by trading early based on pre-disclosure information. Sample firms are the ones with at least one recommendation during the class period.

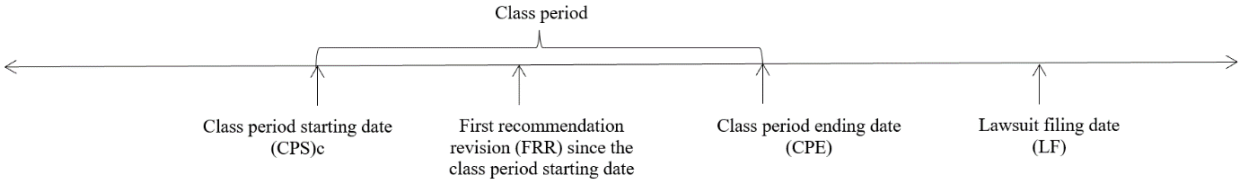

Figure 1. Lawsuits, analyst recommendations, and stock trading.

A sample of 1,977 publicly traded firms is selected initially, and then they are filtered through three criteria. First, I exclude lawsuit firms not included in the CRSP, COMPUSTAT, I/B/E/S, and Thomson Financial/Spectrum 13F databases. Second, I delete stocks with a price less than $1. Third, I focus on the first lawsuit for each firm during the sample period and delete firms with consecutive lawsuits. Finally, 660 unique firms (associated with 831 lawsuits) meet the criteria.

Table 1 shows the sample firm distribution and the reasons for filing securities class action lawsuits. My empirical tests focus on those firms with one lawsuit. For the total number of 831 lawsuit filings, general financial misreporting and artificially inflating securities prices, both violating SEC 1934 section 10(b) and rule, are the most frequently cited reasons. I classify recommendation revisions into two groups: downgrades and upgrades. A downgrade is a recommendation revised by an analyst from a higher level (e.g., strong buy or buy) to a lower level (e.g., underperform or sell) and vice versa for an upgrade. Sometimes analysts do not change their recommendations, which is also classified as upgrade. Analysts usually issue more than one recommendation on a stock during the class period. I keep all recommendations until the first downgrade is issued. Also, I consider only the very first downgrade (upgrade) for each firm among analyst recommendations, as it contains the most significant impact on a stock and triggers subsequent downgrades (upgrades).

Table 1. Financial lawsuits and sample firms.

Sample firms	Number of lawsuits	Number of firms
Initial sample firms	2,286	1,977
Filtered firms	831	740
Firms with 1 lawsuit		660
2 lawsuits		71
3 lawsuits		7
4 lawsuits		2
5 or more lawsuits		0
Reasons for filing lawsuits	Number of firms	%
General financial misreporting	616	74.13
Artificially inflating securities prices	576	69.31
Inadequate internal control	151	18.17
Bond issuance related	55	6.62
Equity issuance related	125	15.04
Mergers and acquisitions related	86	10.35
Insider trading and conflict of interest	349	42.00
SEC 1934 Sections 10(b) and rule 10b-5	584	70.28
SEC 1933 Section 11	149	17.93
GAAP violation/improper accounting	300	36.10
Investment banks also sued in the same filing	36	4.33
Total number of lawsuits	831	

Notes: This table reports the number of financial lawsuits and sample firms and the distribution of the reasons for filing securities class action lawsuits during 1996 to 2006.

Table 2 presents summary statistics of the sample firms. Panel A shows the summary of observations satisfying the sample selection criteria for downgrade (upgrade). Although I focus on financial lawsuit firms, some of them get upgrades only. In Panel A, the sample size of downgraded firms is around 7.5 times larger than upgraded firms due to the nature of the population. There are 582 (78) downgraded (upgraded only) firms, and the total number of institutional investors' holding changes on each group of firms during the quarter before the downgrades (upgrades) is 126,644 (13,010).

Table 2. Descriptive statistics for sample firms.

Panel A. Summary of observations			
	All	Firms with downgrades during the class period	Firms with only upgrades during the class period
Number of unique firms in the sample	660	582	78
Total number of institutional holding changes	139,654	126,644	13,010
Average (median) number of days during the class period	434 (311)	459 (323)	243 (207)
Average (median) number of days from the class period starting date to the date of the first revision	161 (97)	170 (105)	91 (52)

Panel B. Sample firm distribution by revisions		
Recommendation revisions	# of downgraded firms	# of upgraded firms
Firms without upgrade (downgrade) prior to downgrade (upgrade)	474	73
with one upgrade (no revision) prior to downgrade (upgrade)	94	5
with two upgrades (no revision) prior to downgrade	12	
with three upgrades (no revision) prior to downgrade	2	
Total	582	78

Panel C. Financial characteristics and control variables			
Variables	All	Firms with downgrades during the class period	Firms with only upgrades during the class period
Total assets (millions)	7,793	8,502	2,454
Market value (millions)	6,861	6,553	9,179
Book-to-market	0.39	0.40	0.29
Long-term debt-to-total assets	0.16	0.17	0.14
Trading volume (millions)	21.16	21.96	15.17
Market-adjusted return	0.13	0.11	0.25
Average number of analysts following	9.09	9.40	6.79

Notes: This table provides summary statistics for the firms with class-action lawsuits in our sample from 1996 to 2006. The group of firms with downgrades includes all the sample firms that receive at least one downgrade during the class period over which sued firms allegedly commit wrongdoing. The firms in the group may or may not have upgrades. The other group of sample firms includes firms that receive only upgrades during the class period. Panel A presents the summary of observations, including the number of unique firms, the total number of institutional holding changes, average (median) number of days during the class period, and average (median) number of days from the class period starting date to the date of the first downgrade (first upgrade). Panel B shows the distribution of sample firms by revisions. Panel C reports financial characteristics and control variables for the sample firms. All the variables are reported as mean values and computed using the relevant Compustat and CRSP data items. Total assets and market value are reported in millions. Market value is calculated as the price multiplied by shares outstanding. Book-to-Market equals the book value, which is common equity, divided by market capitalization. Leverage is the ratio of long-term debts to total assets. Trading volume, market-adjusted return (past 6 months' (t-7 to t-1) cumulated returns minus the CRSP value-weighted index return), where t is the month of the first recommendation revision, and the average number of analysts following a sample firm are also reported.

The average (median) class period for all sample firms is about 434 (311) days during which sell-side analysts can discover a covered firm's wrongdoing and inform investors of uncovered bad news. Sell-side analysts have an incentive to find out negative information early, raising their reputation, attracting clients, and being compensated for their efforts with trading commissions (Irvine, 2004). It takes on average 170 (91) days for analysts to issue the first downgrade (upgrade) about the covered firms, implying that downgrades need more time in part because of the reluctance of analysts to issue downward revisions (Mao and Song, 2012).

Panel B presents the sample firm distribution by revisions. Among 582 downgraded firms, 474 firms receive first downgrades without prior upgrades since the CPS. The number of firms which receive one upgrade before finally getting downgraded is 94. More than 97% of downgraded firms have 0 or 1 upgrade prior to the first downgrade. The upgraded-only firms are the firms which do not receive any downgrade during the class period. Panel C reports financial characteristics of the firms and control variables of our analysis, including accounting variables such as total assets, book value of equity, and long-term debt to total assets ratio, which are measured at the fiscal year-end preceding the first downgrade (upgrade) on each firm during the class period. All others including trading volume, market-adjusted return calculated as the past 6 months' (t-7 to t-1) cumulated returns minus the CRSP value-weighted index return, and analyst coverage are measured at the end of the quarter prior to the first revision. The downgraded firms are relatively larger than the upgraded firms in terms of total assets. However, average market values of the upgraded firms are higher than those of the downgraded firms. The higher book-to-market ratio indicates that value firms tend to get downgraded. On average, the downgraded firms tend to have a lower prior market-adjusted return than the upgraded firms. More than nine analysts, on average, follow the downgraded firms during the class period.

Table 3. Descriptive statistics for first recommendation revision.

Panel A. First downgrade revision					
Issuer	No.	%	# of days until issuing the downgrade since the class period start	Scaled# days	% of non-first revision
U-SAIs	83	14.21	237 (183)	56.16	96.93
L-SAIs	4	0.68	140 (148)	33.17	98.98
Independent SAIs	196	33.56	148 (86)	31.82	93.65
Independent research firm	301	51.54	166 (101)	35.69	91.66
Total	584	100			
Panel B. First upgrade revision					
Issuer	No.	%	# of days until issuing the upgrade since the class period start	Scaled # days	% of non-first revision
U-SAIs	16	20.51	102 (66)	35.29	98.62
L-SAIs	2	2.82	230 (230)	68.24	99.25
Independent SAIs	19	24.35	64 (35)	29.62	98.74
Independent research firm	41	52.56	93 (53)	39.91	96.85
Total	78	100			

Panel C. Buy and hold stock return				
Holding period	Downgraded firms		Upgraded firms	
	Mean	Median	Mean	Median
Class period starting date to first recommendation revision date	0.1350	-0.0199	0.1304	0.0795
Class period starting date to class period ending date	-0.0686	-0.2820	0.0049	-0.0797
Class period ending date to lawsuit filing date	-0.2483	-0.2409	-0.2935	-0.3070
Class period starting date to lawsuit filing date	-0.2218	-0.4517	-0.2976	-0.3553

Notes: This table provides summary statistics for the first recommendation revision issued by analysts during the class period from 1996 to 2006. The class period is the period during which sued firms allegedly commit wrongdoing. Panel A (Panel B) reports first downgrades (first upgrades), showing the number of firms, the number of days until issuing the downgrades since the class period starting date (CPS), the scaled number of days calculated as the number of days until issuing the downgrades since the class period starting date divided by the number of days during the class period multiplied by 100, and the percentage of non-first revision issuance, based on the type of analysts. Panel C reports buy and hold returns of the sample firms over different holding periods. All variables are defined in Appendix A.

Table 3 provides summary statistics for the first recommendation revision issued by sell-side analysts during the class period. Panels A and B report about the first downgrade and upgrade revisions, respectively. Among 584 first downgrades, 83 (14.21%) downgrades are issued by U-SAIs who wait 237 days for revision since the CPS. The scaled number of days is calculated as the number of days until issuing the downgrades (upgrades) since the CPS, divided by the number of days during the class period, multiplied by 100, which provides the timeliness of updating information regarding the firms by analysts (Mao and Song, 2012). U-SAIs tend to issue downgrades slowly relative to the other analysts, which is consistent with Mao and Song that underwriters are discouraged from disclosing

negative news on firms with an underwriting relationship. In contrast to U-SAIs, independent analysts (both IB-SAIs and NIB-SAIs) and independent research firms, which are pure research institutions without trading arms, are not associated with the firms for other business activities and, therefore, tend to release information promptly. L-SAIs issue the first downgrades very infrequently relative to others, indicating that they are reluctant to reveal negative information because of the possibility of ruining potential profits. The percentage of non-first revision suggests their reluctance as well. For Panel B, most interestingly, U-SAIs are more likely to issue upgrades promptly relative to downgrades, which have a higher percentage of first revision and a lower scaled number of days, showing their support for the underwritten firm even though they were sued later.

Panel C provides buy and hold returns on the firms during each holding period. Both downgraded firms and upgraded firms have positive buy and hold returns until an analyst issues either downgrades or upgrades since the CPS. However, investors finally react negatively to the first downgrade according to buy and hold returns up to the CPE from the CPS. Since the public realizes sued firms' wrongdoing on the CPE, returns would turn negative, resulting in a negative buy and hold stock return for the period from the CPE to the LF. Overall, buy and hold returns for the entire period from the CPS to the LF are -0.2218 for downgraded firms and -0.2976 for upgraded firms.

3. Empirical results

The variable of interest is the trading of SAIs on sued firms. I follow the trading measures from Haushalter and Lowry (2011), which are as follows: First, *HC1* is raw holding changes in a firm's stock from q-2 to q-1, where quarter q is the quarter during which analysts issue the first downgrade (upgrade). Second, *HC2* is percentage changes in ownership of a firm from q-2 to q -1. The third measure is *PC1*, which is a portfolio weight change from q-2 to q-1. Finally, *PC2* is an abnormal portfolio weight change, which is *PC1* minus all 13F institutions' portfolio weight of the stock. The market size of SAIs could impact on *HC1* and *HC2*, while *PC1* could change as price fluctuates. Therefore, *PC2* balances out the irrelevancies.

3.1. Univariate analysis

Juergens and Lindsey (2009) find that informed trading occurs two days prior to a sell-side downgrade. Chan et al. (2009) and Jordan et al. (2012) also find that investment banks follow their own recommendation by looking at holding changes in the quarter of analyst recommendation. However, it could be difficult to identify whether the investment banks react to recommendation revisions, trade in advance, or react to the same public events at the same time as their sell-side analysts do, if quarterly stockholdings are investigated in the quarter when an analyst recommendation is issued. Therefore, I avoid the endogeneity issue in the previous literature and use more conservative measures for stock trading.[4]

Table 4 provides average values of four different measures of changes in the stockholdings of investors one quarter before the quarter during which the sell-side analysts report first recommendation revisions on the sample firms. I examine whether different types of SAIs produce differences in holding changes. I categorize the sample firms in three ways: (1) firms without upgrades prior to the first downgrade (474 firms); (2) firms with one upgrade prior to the first downgrade (94 firms); and (3) firms with only upgrades (78 firms). Panel A presents results for the firms without upgrades prior to first downgrade since the CPS, showing that both SAIs and non-SAIs tend to increase their holdings in the firms. SAIs, on average, increase their holdings (*HC1*) by 288,506, which is significantly different from zero at the 1% level. Similarly, the percentage holding changes (*HC2*) and the portfolio weight change (*PC1*) are significantly positive. Because of the size effect, portfolio weight change (*PC1*) and abnormal portfolio weight change (*PC2*) show more reliable estimates. *PC1* (*PC2*) is 0.0703% (0.0556%), significant at the 1% level. Non-SAIs also increase their positions, making no statistical and economical differences in holding changes between affiliated and non-affiliated investors, except for *HC1* indicating a significant increase in a position. However, U-SAIs and L-SAIs change their holdings significantly different from independent SAIs as well as non-SAIs according to differences on *PC1* and *PC2*, suggesting different trading behaviors by those SAIs.

[4] It is conservative in the sense that I use quarterly holding changes from q-2 to q-1, where q stands for the quarter of recommendations, long before the releases. In fact, informed trading could occur 2 or 3 days before (Juergens and Lindsey, 2009), or even hours before (Heidle and Li, 2005) analyst recommendations are issued.

Table 4. Stockholding changes of SAIs.

	No. of holding changes	HC1	HC2	PC1	PC2
Panel A: Firms without upgrade prior to first downgrade since the class period starting date (No. of firms: 474)					
SAIs	5,322	288,506***	0.0224***	0.0703***	0.0556***
		(5.61)	(3.48)	(6.90)	(5.55)
Non-SAIs	109,213	74,514***	0.0169***	0.0715***	0.0517***
		(14.8)	(10.5)	(22.81)	(16.77)
Difference	114,535	-213,991***	-0.0054	0.0011	-0.0039
		(-4.14)	(-0.81)	(0.10)	(-0.37)
U-SAIs	746	90,168**	0.0256	0.0307***	0.0274**
		(2.01)	(1.22)	(2.59)	(2.36)
Difference	114,535	-5,747	-0.0084	0.0410***	0.0246**
		(-0.12)	(-0.40)	(-3.35)	(2.05)
L-SAIs	114	738,542*	0.1006*	0.0136	0.012
		(1.66)	(1.75)	(1.52)	(1.54)
Difference	114,535	-654,736	-0.0835	0.0578***	0.0399***
		(-1.47)	(-1.45)	(6.11)	(4.77)
Independent SAIs	4,497	309,240***	0.0203***	0.0779***	0.0611***
		(5.21)	(3.04)	(6.54)	(5.22)
Difference	114,535	-233,968***	-0.0032	-0.0067	-0.0095
		(-3.93)	(-0.47)	(-0.54)	(-0.78)
Panel B: Firms with upgrade prior to first downgrade since the class period starting date (No. of firms:94)					
SAIs	505	56,713	0.0998	-0.0056	-0.0071
		(1.37)	(1.28)	(-0.42)	(-0.52)
Non-SAIs	10,205	12,427***	0.0288***	0.0237*	0.0223*
		(2.75)	(3.74)	(1.94)	(1.82)
Difference	10,710	-44,286	-0.071	0.0294	0.0294
		(-1.06)	(-0.90)	(1.61)	(1.60)
Underwriter SAIs	174	119,671	0.2894	0.0216	0.0188
		(1.09)	(1.48)	(1.10)	(0.97)
Difference	10,710	-106,892	-0.2615	0.0007	0.002
		(-0.97)	(-1.34)	(0.03)	(0.09)
Lender SAIs	6	-17,964	-0.0454	-0.0033**	-0.0179
		(-1.21)	(-0.82)	(-2.47)	(-1.28)
Difference	10,710	32,498**	0.0776	0.0257**	0.0388**
		(2.08)	(1.38)	(2.18)	(2.13)
Independent SAIs	327	24,278	0.0013	-0.0202	-0.021
		(0.92)	(0.02)	(-1.12)	(-1.15)
Difference	10,710	-10,070	0.0317	0.0440**	0.0432**
		(-0.37)	(0.51)	(2.02)	(1.97)
Panel C: Firms with only upgrade since the class period starting date (No. of firms: 78)					
SAIs	456	-5,292	0.0207	0.0149	0.0029
		(-0.06)	(0.59)	(0.66)	(0.13)
Non-SAIs	12,554	24,160***	0.0315*	0.0526***	0.0389***
		(3.13)	(1.72)	(4.61)	(3.41)
Difference	13,010	29,452	0.0107	0.0377	0.0359
		(0.38)	(0.27)	(1.49)	(1.42)
Underwriter SAIs	119	-49,885	0.0454	0.026	0.0253
		(-0.33)	(1.03)	(0.89)	(0.89)
Difference	13,010	73,687	-0.0144	0.0254	0.0124
		(0.49)	(-0.30)	(0.81)	(0.39)
Lender SAIs	13	538,622	0.1348	0.0355**	0.0214
		(1.16)	(0.66)	(2.00)	(1.23)
Difference	13,010	-516,009	-0.1037	0.0157	0.0162
		(-1.11)	(-0.51)	(0.75)	(0.79)
Independent SAIs	329	15,173	0.0147	0.0109	-0.0047
		(0.16)	(0.32)	(0.37)	(-0.16)
Difference	13,010	8,161	0.0167	0.0413	0.0435
		(0.08)	(0.33)	(1.31)	(1.38)

*Notes: This table reports the univariate tests of trading activities of SAIs during the quarter prior to a recommendation revision by the type of revisions and investors. SAIs are classified as U-SAIs, L-SAIs, and independent SAIs (IB- and NIB-SAIs). Appendix A provides detailed explanations for all variables. Panel A presents trading activities for the firms without upgrade prior to first downgrade since the class period starting date. Panel B and Panel C present trading activities for the firms with upgrades prior to first downgrades and firms with only upgrades since the class period starting date, respectively. t-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5% or 1% level, respectively.*

Panel B and Panel C present results for the firms with one upgrade prior to first downgrade since the CPS and the firms with only upgrades since the CPS. Looking at all analysts in Panel B, the means of *HC1*, *HC2*, *PC1*, and *PC2* are 56,713 shares, 0.0998 %, -0.0056%, and -0.0071 %, respectively, which are all statistically insignificant, suggesting that SAIs, on average, do not change their holdings prior to the analyst recommendation release. In contrast to the trading behavior of SAIs, non-SAIs do increase their holdings significantly prior to recommendations, showing that all measures are positive and significantly different from zero at the 1% level for *HC1* and *HC2* and at the 10% level for *PC1* and *PC2*. However, there are no significant differences in all the measures between SAIs and non- SAIs. Panel C shows a similar pattern to Panel B. For upgraded firms, all the measures of differences between SAIs and non-SAIs show as insignificantly different, indicating that all institutional investors trade in the same direction. The univariate analysis shows somewhat mixed results on holding changes. Next, I further investigate sources of the difference in a regression analysis setting.

3.2. Multivariate regression analysis

The informed trading of SAIs on the sample firms before analyst recommendations is our primary interest. I conduct multivariate regression analyses with control variables. The model specification is as follows:

$$PC1_{i,j,t} = \alpha_t + \beta * SAI_{i,j,t-1} + \gamma * Controls_{i,j,t-1} + \varepsilon_{i,j,t} \quad (1)$$

where $PC1_{i,j,t}$ is the portfolio weight change of an institutional investor *i* in the stock of sued firm *j* before its analyst's recommendation at time *t*. There are two key variables of interest in our regressions: SAIs and first revision issuer (*FRI*). *SAIs* and *FRI* are dummy variables to designate the identification of institutional investors whose analysts cover the sued firms and whose analysts issue the first revisions, respectively. A negative coefficient on *SAIs* indicates that SAIs decrease their holdings more than non-SAIs. A negative coefficient on *FRI* indicates a first revision issuer reduces its holdings more than non-first revision issuers, including non-SAIs. In order to investigate detailed sources for shared information and potential conflicts of interest that also play a role in trading, I employ a finer classification for SAIs as discussed in the previous section, such as U-SAIs, L-SAIs, IB-SAIs, and NIB-SAIs.

I also control other variables that may affect institutional trading. First, an investment bank's reputation is based on the bank's market share in equity (debt) underwriting (%), calculated as the bank's aggregated total dollar amount in lead underwriting divided by all deal amounts in equity (bond) markets each year. It may play a role in the investment bank's pre-release trading in that high reputation banks possess more research resources and an information advantage and, thereby, tend to front-run before the market realizes. All-star analysts, published in *Institutional Investor's* "All-America Research Team," are more likely to have superior information and may be hired by a high reputation institution. For a sample of downgraded firms, a negative coefficient on all-star analyst (*AA*) indicates that institutional investors weigh their star analysts' opinions, leading them to decrease their portfolio positions. I also report an interaction term between star analysts and first revision issuers, meaning that a first downgrade (upgrade) is issued by a star analyst.

I consider initial portfolio weight (*IPW*) that may lead to a different trading standpoint, especially when an investor has negative information because the potential reaction by investors may depend on the size of the initial position. Total institutional ownership (*TIO*) may have a different effect on trading because of transaction costs and monitoring by institutional investors (Ljungqvist et al., 2007). Brockman et al. (2009) also suggest that block ownership is detrimental to the firm's market liquidity because of its adverse impact on trading activity. The level of recommendation consensus among analysts (*Analyst Consensus*) and the number of analysts following (*Analyst Coverage*) are included to control any effect from previous recommendations and information asymmetry, measured at the end of the quarter prior to the first recommendation revision.

Firms' past performance and financial characteristics are also important pieces of information which are taken into consideration with market adjusted return, size, and book-to-market ratio. The market adjusted return (*Market-adj return*) is calculated as the past 6 months' (t-7 to t-1) cumulated returns minus the CRSP value-weighted index return. The market capitalization (*SIZE*) is measured as price per share multiplied by the number of shares outstanding, and book-to-market ratio is calculated as the book value of equity over the market capitalization.

Table 5 reports the determinants of changes in portfolio weights during the pre-release quarter for each group of sample firms: all downgraded firms, firms without upgrades prior to downgrades, firms with upgrades prior to downgrades, and firms with only upgrades. The dependent variable is the portfolio weight change (*PC1*). The regression results are reported both with and without investment bank and year fixed effects.

Table 5. Determinants of informed trading prior to first recommendation revisions

Panel A. Firms with upgrades prior to first downgrades since the class period starting date vs. Firms with only upgrades								
	Dependent variable: PC1							
Variables	Firms with upgrades prior to first downgrades since the class period starting date				Firms with only upgrades			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SAIs	-0.0335*	-0.0379*			-0.0568*	-0.0641*		
	(-1.74)	(-1.80)			(-1.66)	(-1.87)		
U-SAIs			0.0025	0.0012			-0.0370	-0.0245
			(0.10)	(0.04)			(-0.86)	(-0.53)
L-SAIs			-0.0017	-0.0209			-0.0588**	-0.0653*
			(-0.05)	(-0.53)			(-2.06)	(-1.88)
IB-SAIs			-0.0418**	-0.0480**			-0.0737	-0.0894*
			(-2.21)	(-2.33)			(-1.61)	(-1.94)
NIB-SAIs			-0.0807	-0.0823*			-0.0153	-0.0172
			(-1.65)	(-1.70)			(-0.31)	(-0.36)
Reputation	-0.0150***	-0.0102*	-0.0154***	-0.0113**	-0.0105**	-0.0098*	-0.0097*	-0.0085
	(-2.84)	(-1.83)	(-2.91)	(-2.02)	(-2.01)	(-1.70)	(1.82)	(-1.46)
AA	-0.0059	0.0088	-0.0151	-0.0007	0.0347	0.0429	0.0366	0.0436
	(-0.38)	(0.54)	(-0.81)	(-0.04)	(1.11)	(1.35)	(1.15)	(1.35)
FRI	-0.0080	-0.0098	-0.0086	-0.0109	0.0299	0.0247	0.0320	0.0259
	(-0.43)	(-0.51)	(-0.45)	(-0.55)	(0.68)	(0.54)	(0.71)	(0.54)
First revision from All-star analyst	0.0671	0.0726	0.0674	0.0728	-0.1084***	-0.0448***	-0.1087	-0.0450***
	(1.28)	(1.40)	(1.29)	(1.41)	(-4.39)	(-2.58)	(-4.39)	(-2.60)
IPW	-0.1970	-0.1974	-0.1970	-0.1974	-0.1598***	-0.1625***	-0.1598***	-0.1625***
	(-1.47)	(-1.47)	(-1.47)	(-1.47)	(-2.73)	(-2.75)	(-2.73)	(-2.74)
TIO	0.0008**	0.0004	0.0008**	0.0004	0.0010*	0.0004	0.0010	0.0004
	(2.09)	(1.07)	(2.10)	(1.08)	(1.74)	(1.10)	(1.74)	(1.10)
Analyst Consensus	0.0040	0.0064	0.0038	0.0063	-0.0066	0.0244	-0.0066	0.0245
	(0.20)	(0.22)	(0.19)	(0.22)	(-0.39)	(0.49)	(-0.39)	(0.49)
Analyst Coverage	-0.0045*	-0.0067*	-0.0045*	-0.0067*	-0.0023	-0.0005	-0.0023	-0.0005
	(-1.70)	(-1.73)	(-1.69)	(-1.72)	(-1.45)	(-0.31)	(-1.44)	(-0.30)
SIZE	0.0000	0.0000	0.0000	0.0000	0.0000***	0.0000***	0.0000**	0.0000***
	(0.03)	(0.24)	(0.03)	(0.25)	(4.42)	(3.49)	(4.42)	(3.49)
BM	0.0316	0.0423	0.0318	0.0425	0.0756**	-0.0285	0.0761**	-0.0276
	(0.71)	(0.84)	(0.71)	(0.85)	(2.32)	(-0.56)	(2.33)	(-0.54)
MAR	0.0002	0.0047	0.0005	0.0051	0.0140	-0.0505**	0.0141	-0.0505**
	(0.01)	(0.20)	(0.03)	(0.22)	(0.68)	(-2.51)	(0.69)	(-2.50)
Intercept	0.0062	-0.0592	0.0060	-0.0592	0.0233	-0.1243	0.0230	-0.1250
	(0.06)	(-0.44)	(0.06)	(-0.44)	(0.25)	(-0.70)	(0.25)	(-0.71)
Fixed effect	No	Yes	No	Yes	No	Yes	No	Yes
Number of obs.	10,710	10,710	10,710	10,710	13,010	13,010	13,010	13,010
R-squared	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04

Panel B. All downgraded firms vs. Firms without upgrades prior to downgrades since the class period starting date								
	Dependent variable: PC1							
Variables	All downgraded firms				Firms without upgrades prior to downgrades			
SAIs	-0.0075	-0.0072			-0.0032	-0.0031		
	(-0.46)	(-0.44)			(-0.18)	(-0.17)		
U-SAIs			-0.0188	-0.0126			-0.0198	-0.0141
			(-1.21)	(-0.81)			(-1.13)	(-0.80)
L-SAIs			-0.0359*	-0.0374**			-0.0382**	-0.0396**
			(-1.94)	(-2.33)			(-2.01)	(-2.21)
IB-SAIs			-0.0371***	-0.0390***			-0.0359***	-0.0397***

			(-3.15)	(-3.25)			(-2.82)	(-2.92)
NIB-SAIs			0.1044**	0.1058**			0.1183**	0.1200**
			(2.03)	(2.04)			(2.14)	(2.17)
Reputation	-0.0136***	-0.0129***	-0.0096***	-0.0081**	-0.0123***	-0.0119***	-0.0077***	-0.0062
	(5.58)	(-3.15)	(-4.46)	(2.18)	(-4.72)	(-2.84)	(-3.25)	(-1.64)
AA	-0.0298**	-0.0266*	-0.0224*	-0.0190	-0.0339**	-0.0313*	-0.0249*	-0.0221
	(-1.98)	(-1.74)	(-1.68)	(-1.43)	(-2.01)	(-1.83)	(-1.70)	(-1.50)
FRI	-0.0317**	-0.0314**	-0.0344**	-0.0346**	-0.0327**	-0.0311*	-0.0345**	-0.0332*
	(-2.17)	(-2.12)	(-2.27)	(-2.26)	(-1.98)	(-1.84)	(-2.03)	(-1.93)
First revision from All-star analyst	-0.0048	0.0110	-0.0047	0.0111	-0.0128*	0.0057	-0.0127*	0.0057
	(-0.62)	(1.34)	(-0.61)	(1.34)	(-1.76)	(0.71)	(-1.75)	(0.72)
IPW	-0.2106***	-0.2104***	-0.2106***	-0.2104***	-0.2036***	-0.2032***	-0.2036***	-0.2032***
	(-6.46)	(-6.45)	(-6.46)	(6.45)	(-6.25)	(-6.23)	(-6.25)	(-6.23)
TIO	-0.0015***	-0.0019***	-0.0015***	-0.0019***	-0.0018***	-0.0022***	-0.0018***	-0.0022***
	(-8.18)	(-10.00)	(-8.16)	(-9.99)	(-9.08)	(-10.60)	(-9.08)	(-10.59)
Analyst Consensus	0.0153***	0.0288***	0.0152***	0.0288***	0.0206***	0.0331***	0.0206***	0.0331***
	(3.02)	(5.58)	(3.01)	(5.57)	(3.82)	(6.04)	(3.81)	(6.04)
Analyst Coverage	-0.0011*	-0.0005	-0.0011*	-0.0005	-0.0011*	-0.0004	-0.0011*	-0.0004
	(-1.69)	(-0.82)	(-1.67)	(-0.81)	(-1.66)	(-0.69)	(-1.65)	(-0.68)
SIZE	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(27.50)	(27.32)	(27.48)	(27.28)	(27.25)	(26.97)	(27.22)	(26.93)
BM	0.0292*	0.0268	0.0292*	0.0267	0.0474**	0.0434**	0.0474**	0.0433**
	(1.77)	(1.49)	(1.77)	(1.49)	(2.52)	(2.08)	(2.52)	(2.08)
MAR	-0.0294***	-0.0299***	-0.0294***	-0.0299***	-0.0337***	-0.0329***	-0.0337***	-0.0329***
	(-4.89)	(-4.93)	(-4.89)	(-4.93)	(-5.28)	(-5.06)	(-5.28)	(-5.06)
Intercept	0.0815***	0.0767*	0.0813***	0.0770*	0.0747***	0.0841*	0.0745***	0.0842*
	(2.93)	(1.80)	(2.92)	(1.80)	(2.57)	(1.77)	(2.56)	(1.77)
Fixed effect	No	Yes	No	Yes	No	Yes	No	Yes
Number of obs.	126,644	126,644	126,644	126,644	114,535	114,535	114,535	114,535
R-squared	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10

*Notes: This table reports regression results of portfolio weight change (PC1) for analysts' recommendations. PC1 is the dependent variable calculated as the change in portfolio weight of a stock in an institutional investor's portfolio from the beginning of the quarter, which is the quarter preceding the recommendation quarter, to the end of the quarter. Independent variables include dummy variables that represent whether a recommendation is issued by an analyst affiliated with a financial institution holding the covered firm (SAIs), an analyst issuing a recommendation on a firm is employed by an underwriter of the firm (U-SAIs), an analyst issuing a recommendation on a firm is employed by a bank lending the firm (L-SAIs), and an analyst issuing a recommendation on a firm is independent of the firm. The independent analyst institutions are separated into institutions with (IB-SAIs) and without investment banking (NIB-SAIs). All variables are defined in Appendix A. Panel A reports regression coefficients for firms with upgrades prior to first downgrades and firms with only upgrades. Panel B reports regression coefficients for all downgraded firms and firms without upgrades prior to downgrades.t-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5% or 1% level, respectively.*

Panel A shows regression results for firms with upgrades prior to the first downgrades and firms with only upgrades. I start by investigating the informed trading of SAIs, reported with the coefficients on *SAIs* from columns (1), (2), (5), and (6). Interestingly, the coefficients on *SAIs*, -0.0379 with fixed effect (-0.0335 without fixed effect), are negative and significant, indicating that after controlling for other variables, affiliated investors decrease their portfolio weight 0.0379 (0.0335) % more than non-SAIs. Even for the firms with only upgrades for which analysts never downgrade during the class period, the coefficients on *SAIs*, -0.0568 (-0.0641), remain negative and significant.

The negative coefficients are driven by different types of analysts between the two samples as I investigate further with a finer classification, shown in columns (3), (4), (7), and (8). According to the detailed regressions, I find that IB-SAIs are the major sources for the firms with downgrades, and L-SAIs are for the firms with upgrades.

Looking at each type of analyst for the firms with downgrades, after controlling for other variables, the coefficients on *U-SAIs* are positive and insignificant. U-SAIs do not trade differently from non-SAIs. It is possible that they possess pre-release information, but do not want to exploit it by selling because of their support for the firms with an underwriting relationship. In the case of an IPO, Facebook, on May 18, 2012, went public at a debut price of $38 per share, which fell to $27.72 on June 1.[5] As the price fell, the lead underwriter of Facebook, Morgan Stanley, reportedly stepped in to keep the stock from breaking through its offer price, while Reuters revealed that the bank's analysts downgraded their estimates about the future earnings of the company. Schultz and Zaman (1994) and Aggarwal (2000) document that underwriters repurchase large quantities of stock in the aftermarket. Lender SAIs' holdings and independent non-IB SAIs' holdings are insignificant. However, IB-SAIs, -0.0480 (-0.0418) are negative and highly significant, indicating more reduction of portfolio position on the firms than non-SAIs. One possible explanation is that IB-SAIs have no underwriting relationship with the firms, and thereby are not under pressure like underwriters so that they can sell those firms which end up having downgrades.

Another key variable is the first revision issuer, whose coefficients are not significant, suggesting no change in shareholdings. This indicates that those issuers do not decrease portfolio position because of a coming upgrade. A number of the controls are significant. Investment bank reputation (*Reputation*) matters in that high reputational institutions decrease shareholdings more than low reputational institutions. *PC1* decreases more when the level of institutional ownership is higher. Firms with more analyst coverage incurred more selling.

As for the firms with only upgrades, only 78 firms did not receive downgrades during the entire class period. L-SAIs are the sellers on the firms while other SAIs are not. For the firms with only upgrades, the lender analysts may notice negative information related to, in particular, the firms' debts.[6] One possibility is that SAIs do not view the analysts' recommendations as informative. Thus, the investors decrease their holdings based on their own research, regardless of the analysts' reports. Another possibility is that analysts simply give the traders pre-release tips that differ from their reporting. *The Wall Street Journal* (WSJ) reports that analysts at Goldman Sachs sometimes shared with traders and key clients short-term trading tips that sometimes differed from the firm's long-term research.[7] According to our findings, the allegation is not without merit.

Panel B of Table 5 reports the same regression analysis for all firms with downgrades and firms without upgrades prior to downgrades. The results are similar between the two groups. In contrast to previous results, coefficients on *SAIs* are negative but insignificant. Looking at regression analysis with the finer classification, I find that the change in holdings of both *L-SAIs* and *IB-SAIs* are negative and statistically significant, while that of independent *NIB-SAIs* are positive and significant, offsetting each other's effect on trading and, thereby, making SAIs insignificant.

L-SAIs and IB-SAIs significantly reduce their positions in both groups of firms, suggesting that they can execute transactions without pressure as underwriters have. In contrast to other SAIs, NIB-SAIs which do not have investment banking operations trade in the opposite direction, meaning that they tend to increase their holdings prior to downgrades. There are two potential explanations in which different types of SAIs may result in differences in the pre-release trading. First, a pure independent SAI does not obtain more accurate and superior information from their research divisions simply because the analysts themselves do not have the ability to gather information and produce quality research. Jacob et al. (2008) compares IB analysts with non-IB analysts, suggesting that the IB analysts' forecasts are on average more accurate than forecasts made by other analysts. The possible resource advantages for the IB analysts include the employment of higher-quality analysts and investment banking affiliations. Second, investment banks may be less strict to the "Chinese wall", and thereby share information more frequently, making them execute transactions in a timely fashion, which is consistent with the so-called "tipping hypothesis."

FRI identifies whether the first revision is issued by an SAI's own analyst. Across the different samples and different specifications, the coefficients of the variable are negative and statistically significant, indicating that the first revision issuers tend to decrease shareholdings in the covered firms. I explore this issue in greater depth later in this section by employing interaction terms in which each type of SAIs is multiplied by the first revision issuer dummy and find supportive evidence for this explanation. Whether the first revision analyst is a star does not affect institutional trading significantly beyond the overall effect of first revision analysts.

[5] See, The Washington Post, https://www.washingtonpost.com/business/economy/facebook-stock-performance-ipo-said-to-be-under-investigation-by-sec/2012/06/01/gJQAWiy37U_story.html

[6] Investigating the detailed reason is beyond the scope of this study.

[7] Goldman's trading tips reward its biggest clients, *The Wall Street Journal*, August 24, 2009

Reputation is negative and highly significant, indicating more selling for higher reputation. For the initial position, it is negatively related to the holding institution's later position, implying that when a financial institution has a higher position, it is more likely to sell its shares in a firm for which its analyst has negative information. There is more selling for firms with a higher degree of institutional ownership and higher past performance. *Analyst Coverage* is highly significant. Institutional investors increase their position when the consensus is high.

Table 6 reports the regression results with those interaction terms for all downgraded firms, where each type

Table 6. Determinants of informed trading prior to first recommendation revisions issued by their own sell-side analysts.

Variables	Dependent Variable: PC1			
	(1)	(2)	(3)	(4)
SAIs	-0.0075	-0.0072		
	(-0.46)	(-0.44)		
SAIs* FRI	-0.0317**	-0.0314**		
	(-2.17)	(-2.12)		
U-SAIs			-0.0191	-0.0123
			(-1.20)	(-0.78)
U-SAIs*FRI			-0.0289**	-0.0363**
			(-2.01)	(-2.39)
L-SAIs			-0.0390**	-0.0397**
			(-2.05)	(-2.39)
L-SAIs*FRI			0.0570**	0.0346*
			(2.42)	(1.97)
IB-SAIs			-0.0384***	-0.0404***
			(-3.29)	(-3.40)
IB-SAIs*FRI			-0.0090	-0.0063
			(-0.64)	(-0.43)
NIB-SAIs			0.1113**	0.1128**
			(2.05)	(2.07)
NIB-SAIs*FRI			-0.1489**	-0.1497**
			(-2.22)	(-2.25)
Reputation	-0.0136***	-0.0129***	-0.0097***	-0.0081**
	(-5.58)	(-3.15)	(-4.48)	(-2.20)
AA	-0.0298**	-0.0266*	-0.0226*	-0.0192
	(-1.98)	(-1.74)	(-1.69)	(-1.44)
First revision from Allstar analyst	-0.0048	0.0110	-0.0048	0.0110
	(-0.62)	(1.34)	(-0.61)	(1.34)
IPW	-0.2106***	-0.2104***	-0.2106***	-0.2104***
	(-6.46)	(-6.45)	(-6.46)	(-6.45)
TIO	-0.0015***	-0.0019***	-0.0015***	-0.0019***
	(-8.18)	(-10.00)	(-8.17)	(-9.99)
Analyst Consensus	0.0153***	0.0288***	0.0152***	0.0288***
	(3.02)	(5.58)	(3.00)	(5.57)
Analyst Coverage	-0.0011*	-0.0005	-0.0011*	-0.0005
	(-1.69)	(-0.82)	(-1.68)	(-0.81)
SIZE	0.0000***	0.0000***	0.0000***	0.0000***
	(27.50)	(27.32)	(27.47)	(27.28)
BM	0.0292*	0.0268	0.0292*	0.0267
	(1.77)	(1.49)	(1.77)	(1.48)
MAR	-0.0294***	-0.0299***	-0.0294***	-0.0299***
	(-4.89)	(-4.93)	(-4.89)	(-4.93)
Intercept	0.0815***	0.0767*	0.0815***	0.0770*
	(2.93)	(1.80)	(2.93)	(1.80)
Fixed effect	No	Yes	No	Yes
Number of obs.	126,644	126,644	126,644	126,644
R-squared	0.09	0.09	0.09	0.09

*Notes: This table reports regression coefficients on portfolio weight change (PC1) for recommendation revisions issued by their own analysts and others. PC1 is the dependent variable calculated as the change in portfolio weight of a stock in an institutional investor's portfolio from the beginning of the quarter, which is the quarter preceding the recommendation quarter, to the end of the quarter. Independent variables include dummy variables that represent whether a recommendation is issued by an analyst affiliated with a financial institution holding the covered firm (SAIs), an analyst issuing a recommendation on a firm is employed by an underwriter of the firm (U-SAIs), an analyst issuing a recommendation on a firm is employed by a bank lending to the firm (L-SAIs), and an analyst issuing a recommendation on a firm is independent of the firm. The independent analyst institutions are separated into institutions with (IB-SAIs) and without investment banking (NIB-SAIs). The first revision issuer dummy (FRI) is multiplied with each type of analyst affiliation. All variables are defined in Appendix A. t-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5% or 1% level, respectively.*

of analyst is multiplied by *FRI*. The coefficient on *SAIs*FRI* is -0.0314 (-0.0317) in column 2 (column 1), indicating that after controlling for other factors, SAIs decrease their portfolio weight 0.0314% more when they issue first downgrades among others. Looking at the detailed regression analysis, I find that U-SAIs and NIB-SAIs also sell more only when they are the first revision issuers. The first downgrade is important because it signals firms' overall quality to the public, triggering multiple downgrades afterward. And it is likely that the issuer collects information about a covered firm and disseminates it to the market in a timely fashion. Therefore, SAIs would benefit from subsequent retail trading, if they are able to sell before the first downgrade, and the first revision issuers do so. L-SAIs are, on average, sellers although they increase their portfolio position when they issue first downgrades. The coefficients on *IB-SAIs* are negative and significant, suggesting that IB-SAIs are strong front-runners, even if they are not the first revision issuers. Other control variables remain similar to the regression analysis for downgraded firms in Panel B of Table 5.

3.3. Regression analysis of the pre- and post-recommendation period

So far, the empirical results support our hypotheses that SAIs decrease their portfolio weights more than non-SAIs before analysts' revisions that potentially impact firms' investment value negatively. Once analysts reveal their opinions through recommendations, however, non-affiliated institutions may take on buying or selling that depends on the level of recommendation (e.g., buy or sell) as well. Therefore, I examine how changes in portfolio weights for the post-recommendation period are different from those for the pre-recommendation period.

Table 7 reports the regression results for portfolio weight changes during the pre- and post- recommendation periods. I include interaction terms in which all the primary interest dummy variables such as *SAIs*, *U-SAIs*, *L-SAIs*, *IB-SAIs*, and *NIB-SAIs* are multiplied by the post-recommendation period dummy variable, *Post-Rec*. I analyze two different groups of sample firms, all downgraded firms and firms without upgrades prior to downgrades. The results are very similar. In columns (1) and (3), the negative and insignificant coefficients on both *SAIs* and *SAIs*Post-Rec* show no difference in holding changes between affiliated and non-affiliated institutions. The post-recommendation period dummy variable (*Post-Rec*) shows a statistically significant and negative coefficient, implying that non-affiliated institutions on average decrease stockholdings in the lawsuit firms after the release of recommendations. The results suggest that after pre-release trading of SAIs, non-SAIs realize the lawsuit firms' quality through the first downgrades and follow the direction set by the SAIs. It provides the SAIs with incentives to trade early and benefit themselves at the expense of retail clients.

Columns (2) and (4) show consistent evidence that SAIs decrease stockholdings significantly during the pre-recommendation period, except for the NIB-SAIs. U-SAIs, L-SAIs, and IB-SAIs lower stockholdings by 0.0337%, 0.0502%, and 0.0494% for all downgraded firms, respectively (0.0349%, 0.0487%, and 0.0462% for firms without upgrades prior to downgrades, respectively) of portfolio weights significant at about the 1% level during the quarter before recommendations, while L-SAIs and IB-SAIs increase those positions during the post-recommendation period relative to non-SAIs. It seems that those SAIs sell stocks at a higher price before negative news comes out and then buy them at a lower price after downgrades when everyone else sells. The results support this strategic trading behavior of SAIs. NIB-SAIs, however, trade in the direction indicated by first revisions. I will investigate post-recommendation stock performance traded by each type of SAIs in the next section.

3.4. Stock price performance around recommendation revisions

Prior results show that SAIs decrease their holdings before the release of recommendations. In order to say that the trades by SAIs are information-driven and designed to benefit themselves at the expense of retail client trades, I explore stock price performance around recommendation revisions. If U-SAIs and IB-SAIs have more accurate and superior information, then the stocks purchased (sold) by the investment banks outperform (underperform) stocks purchased (sold) by the other SAIs. Table 8 shows abnormal returns to first recommendation revisions. I calculate abnormal returns using a four-factor model (Carhart, 1997).

$$R_t = \alpha + \beta_1 \times RMRF_t + \beta_2 \times SMB_t + \beta_3 \times HML_t + \beta_4 \times MOM_t + e_t \quad (2)$$

where $R_t$is the excess return in month t on a firm; $RMRF_t$ is the CRSP value-weighted market return minus the risk-free rate in month t; and SMB_t, HML_t, and MOM_t are the month t return of portfolios based on size, book-to-market, and momentum effects, respectively. The abnormal return is the difference between realized return and expected return based on the model. The event window ranges from 2 days to 6 months. The announcement date of the first revision is the event date.

Table 7. Regression results for portfolio weight change during the pre- and post- recommendation period.

Variables	Dependent variable: PC1			
	All downgraded firms		Firms without upgrades prior to downgrades	
	(1)	(2)	(3)	(4)
SAIs	-0.0194		-0.0139	
	(-1.42)		(-0.94)	
SAIs*Post-Rec	-0.0134		-0.0183	
	(-0.81)		(-1.02)	
U-SAIs		-0.0337**		-0.0349**
		(-2.55)		(-2.36)
U-SAIs*Post-Rec		0.0094		0.0224
		(0.56)		(1.45)
L-SAIs		-0.0502***		-0.0487***
		(-3.96)		(-3.44)
L-SAIs*Post-Rec		0.0654***		0.0625***
		(5.47)		(5.02)
IB-SAIs		-0.0494***		-0.0462***
		(-5.08)		(-4.64)
IB-SAIs*Post-Rec		0.0255**		0.0200*
		(2.13)		(1.81)
NIB-SAIs		0.1203**		0.1374**
		(2.24)		(2.40)
NIB-SAIs*Post-Rec		-0.2082***		-0.2349***
		(-2.66)		(-2.81)
FRI	-0.0435***	-0.0458***	-0.0466***	-0.0478***
	(-2.80)	(-2.86)	(-2.65)	(-2.66)
FRI*Post-Rec	0.0819***	0.0843***	0.0892***	0.0901***
	(3.35)	(3.35)	(3.25)	(3.21)
First revision from Allstar analyst	-0.0165**	-0.0164**	-0.0228***	-0.0226***
	(-2.05)	(-2.04)	(-3.04)	(-3.03)
First revision from Allstar analyst*Post-Rec	0.0869***	0.0867***	0.1144***	0.1142***
	(5.85)	(5.84)	(8.21)	(8.20)
Post-Rec dummy	-0.0804***	-0.0804***	-0.0874***	-0.0874***
	(-14.48)	(-14.48)	(-15.06)	(-15.06)
Reputation	-0.0087***	-0.0069***	-0.0077***	-0.0057**
	(-3.24)	(-2.60)	(-2.78)	(-2.05)
AA	-0.0055	-0.0028	-0.0073	-0.0041
	(-0.73)	(-0.40)	(-0.89)	(-0.55)
IPW	-0.1716***	-0.1716***	-0.1486***	-0.1486***
	(-7.10)	(-7.10)	(-7.39)	(-7.39)
TIO	-0.0010***	-0.0010***	-0.0013***	-0.0013***
	(-8.33)	(-8.33)	(-10.78)	(-10.77)
Analyst Consensus	0.0304***	0.0304***	0.0329***	0.0329***
	(9.78)	(9.77)	(10.09)	(10.08)
Analyst Coverage	0.0015***	0.0015***	0.0013***	0.0013***
	(4.09)	(4.09)	(3.68)	(3.69)
SIZE	0.0000***	0.0000***	0.0000***	0.0000***
	(26.10)	(26.07)	(26.61)	(26.57)
BM	0.0039	0.0038	0.0002	0.0002
	(0.54)	(0.53)	(0.04)	(0.03)
MAR	-0.0208***	-0.0208***	-0.0275***	-0.0275***
	(-6.65)	(-6.65)	(-8.36)	(-8.36)
Intercept	0.0060	0.0061	0.0178	0.0178
	(0.32)	(0.32)	(0.92)	(0.92)
Fixed effect	Yes	Yes	Yes	Yes
Number of obs.	253,288	253,288	229,070	229,070
R-squared	0.05	0.05	0.05	0.05

*Notes: This table reports regression coefficients on portfolio weight change (PC1) for recommendation revisions issued by sell-side analysts. PC1 is the dependent variable calculated as the change in portfolio weight of a stock in an institutional investor's portfolio from the beginning of the quarter, which is the quarter preceding the recommendation quarter, to the end of the quarter. Independent variables include dummy variables that represent whether a recommendation is issued by an analyst affiliated with a financial institution holding the covered firm (SAIs), an analyst issuing a recommendation on a firm is employed by an underwriter of the firm (U-SAIs), an analyst issuing a recommendation on a firm is employed by a bank lending to the firm (L-SAIs), and an analyst issuing a recommendation on a firm is independent of the firm. The independent analyst institutions are separated into institutions with (IB-SAIs) and without investment banking (NIB-SAIs). A post recommendation period dummy (Post-Rec) is multiplied with each type of analyst affiliation. All variables are defined in Appendix A. t-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5% or 1% level, respectively.*

Panel A of Table 8 provides cumulative abnormal returns around first recommendation revisions for all firms, upgraded firms, and downgraded firms. The total number of all firms is 660. Abnormal returns from all windows

Table 8. Abnormal returns around first recommendation revisions.

Panel A: Cumulative abnormal returns of sample firms surrounding first recommendation revisions							
		Pre-revision				Post-revision	
Sample firms	N	2 day (0,1)	3 day (-1,1)	3 month	6 month	3 month	6 month
Upgraded	78	0.0325***	0.0411***	0.0019	0.0302	-0.1817***	-0.2448***
		(5.12)	(5.28)	(0.04)	(0.56)	(-4.79)	(-4.56)
Downgraded	582	-0.0629***	-0.0829***	-0.0463***	-0.0784***	-0.1617***	-0.3030***
		(-27.72)	(-27.72)	(-3.30)	(-3.95)	(-11.54)	(-15.30)
Panel B: Cumulative abnormal returns of all downgraded firms held by different types of SAIs							
Type of analyst		Pre-revision				Post-revision	
	N	2 day (0,1)	3 day (-1,1)	3 month	6 month	3 month	6 month
U-SAIs	260	-0.0755***	-0.0977***	-0.0516**	-0.0838***	-0.1508***	-0.2542***
		(-18.85)	(-19.90)	(-2.26)	(-2.59)	(-6.61)	(-7.88)
L-SAIs	91	-0.0299***	-0.0364***	-0.0108	-0.0522*	-0.1382***	-0.2416***
		(-7.19)	(-7.15)	(-0.45)	(-1.55)	(-5.81)	(-7.18)
IB-SAIs	455	-0.0606***	-0.0726***	-0.0395***	-0.0718***	-0.1384***	-0.2426***
		(-23.46)	(-22.97)	(-2.89)	(-3.71)	(-10.14)	(-12.55)
NIB-SAIs	322	-0.0611***	-0.0666***	-0.0133	-0.0355**	-0.1258***	-0.2476***
		(-21.42)	(-19.07)	(-0.98)	(-1.84)	(-9.25)	(-12.87)
Panel C: Cumulative abnormal returns of all downgraded firms based on trading by SAIs							
Trading type					Post-revision performance		
One quarter prior to revisions		Quarter of revisions		# of firms	3 month	6 month	9 month
U-SAIs:							
Increase		Increase		48	-0.0089	-0.0029	-0.1609**
					(-0.17)	(-0.03)	(-1.78)
Increase		Decrease		54	-0.1210***	-0.0201	-0.1983***
					(-2.65)	(-0.31)	(-2.51)
Decrease		Increase		96	-0.1245***	-0.2022***	-0.2780***
					(-3.29)	(-3.78)	(-4.24)
Decrease		Decrease		34	-0.0844**	-0.5135***	-0.5346***
					(-1.84)	(-7.94)	(-6.75)
L-SAIs:							
Increase		Increase		34	-0.1284***	-0.2172***	-0.2574***
					(-3.91)	(-4.65)	(-4.51)
Increase		Decrease		16	-0.1533***	-0.2859***	-0.3643***
					(-3.04)	(-4.01)	(4.17)
Decrease		Increase		20	-0.1468***	-0.2165***	-0.2023***
					(-3.31)	(-3.45)	(-2.63)
Decrease		Decrease		8	-0.0823	-0.1971**	-0.3078***
					(-1.08)	(-1.83)	(-2.34)
IB-SAIs:							
Increase		Increase		118	-0.1021***	-0.2399***	-0.3215***
					(-5.53)	(-9.18)	(-10.05)
Increase		Decrease		106	-0.1831***	-0.2743***	-0.3233***
					(-5.67)	(-6.00)	(-5.78)
Decrease		Increase		77	-0.1638***	-0.1726***	-0.2748***
					(-5.91)	(-4.40)	(-5.72)
Decrease		Decrease		53	-0.1283***	-0.4121***	-0.5778***
					(-3.01)	(-6.85)	(-7.85)
NIB-SAIs:							
Increase		Increase		75	-0.1694***	-0.2859***	-0.3401***
					(-6.98)	(-8.32)	(-8.10)
Increase		Decrease		67	-0.1070***	-0.2211***	-0.3405***
					(-3.36)	(-4.91)	(-6.18)
Decrease		Increase		65	-0.0781**	-0.1500***	-0.2272***
					(-2.08)	(-2.82)	(-3.49)
Decrease		Decrease		51	-0.0443	-0.2511***	-0.2218***
					(-1.09)	(-4.40)	(-3.17)

Notes: This table reports abnormal returns around first recommendation revisions. Abnormal returns are calculated using the four-factor model (Carhart, 1997). Panel A presents cumulative abnormal returns on various event windows (2-day, 3-day, 3-month, and 6-month) for upgraded firms and downgraded firms. The number of firms in each category (N) is also reported. The event date is a first recommendation revision date since the class period starting date. Panel B shows cumulative abnormal returns of downgraded firms held by different types of analyst-affiliated institutions over the various event windows. Panel C presents cumulative abnormal returns of firms that each type of SAIs buys or sells a quarter prior to

*and of the first recommendation revisions. Buys (sells) are defined as those stocks for which affiliated institutions increase (decrease) holdings (measured with portfolio weight changes) in the quarter before and of the recommendation revisions. t-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5% or 1% level, respectively.*

show negative and significant results. I separate the firms into two groups, upgraded firms and downgraded firms to see which firms drive the negative abnormal returns. Looking at the upgraded firms, consisting of 78 firms, a day before through a day after the upgrade, the investors react positively to the issued recommendation. However, the effect of upgrades ends shortly after 3 to 6 months, leading to negative abnormal returns. It is possible that even if these firms never receive downgrades, they may perform poorly.

Additionally, they may have a downgrade after the class period end date when their wrongdoing became public, ending up facing a financial lawsuit. For downgraded firms, as I expected, they have negative and highly significant abnormal returns during the 2- and 3-day window. Those firms performed poorly even before their downgrades, which may have prompted analysts to issue the downgrades. During the post-revision period, the negative abnormal returns of downgraded firms are lower than those of upgraded firms.

I calculate cumulative abnormal returns for downgraded firms only held by SAIs (Panel B). Among 582 downgraded firms, underwriter SAIs hold 260 firms on the revision date. The firms have negative abnormal returns at various windows. Firms held by other types of analysts follow a similar pattern. Therefore, I further classify those firms into groups based on trading by each type of analyst, reported in Panel C.

Trading type shows whether SAIs buy or sell during the quarter prior to or of the revisions. Since I may have more than one SAI holding a firm, the number of SAIs is used to determine the trading type. For example, I count the number of analysts increasing *PC1* and compare it with those decreasing *PC1*. If the number of SAIs increasing *PC1* is larger, then I call it "Increase." Otherwise, it is named "Decrease." I drop firms having the same number of SAIs increasing and decreasing.

Within each type of SAIs, sells in the quarter prior to revisions and sells in the quarter of revisions show the largest negative abnormal returns for 9 months. If analysts buy stocks during the quarter of revision, then most of the stocks perform better than the rest, and vice versa, which indicates SAIs' trading is information driven. Among sells, investors react strongly for longer terms (6- or 9-month window) to those stocks sold in both quarters by U-SAIs (-0.5346 for 9 month) and IB-SAIs (-0.5778), while the stocks sold by NIB-SAIs have the smallest negative abnormal returns, indicating there is less reaction relative to other SAIs. The results support the idea that IB-SAIs have superior information about the covered firms, and investors react much more to those SAIs' trading.

4. Robustness tests

The evidence presented in this paper supports the hypothesis that SAIs change their holdings prior to their analysts releasing recommendation revisions. However, the portfolio rebalancing may be driven by potential confounding events that occur before revisions. In particular, prior downgrades issued during the holding period would lead to a reduction of portfolio position. Therefore, I control for any downgrade during the quarter prior to revisions. Table 9 reports robustness tests using all downgraded firms with three different dependent variables. The first regression (1) using *PC1* as the dependent variable is the same regression for all downgraded firms in Panel B of Table 5 except *Pre-downgrade dummy*. The coefficients on the variable are negative and significant, showing institutional trading in response to the pre-downgrades. The coefficients of *L-SAIs* and *IB-SAIs* remain strongly negative.

To further ensure the robustness of the results, I use the abnormal portfolio weight changes (*PC2*) for regression analysis. The sued firms may be sold by not only the IB-SAIs, but also by overall institutional investors, providing a spurious relationship between analyst affiliation and banks' portfolio changes. Therefore, I calculate the abnormal portfolio weight change, which is the change in the portfolio weight of a stock in an institution's portfolio less the change in the portfolio weight of that stock in the overall institutional investors.[8] Columns (2) shows that investment bank SAIs decrease the abnormal portfolio weights in the sued firms, relative to non-SAIs.

Lastly, I examine whether SAIs decrease holdings of downgraded firms in excess of the decrease in holdings of the control stocks that are located in the same industry. SAIs might not change their holdings only in the stocks of downgraded firms but also do so in all the stocks located in the same industry. This would cause a spurious relationship between affiliation and trading. To avoid the potential problem, I employ difference in portfolio weight change (*PC3*) as the other dependent variable calculated as the difference in portfolio weight changes between downgraded firms and control firms that are non-sued, located in the same industry, and held by the same institution. The results in column (3) of Table 9 are consistent with the previous results.

[8] I do not exclude SAIs from the overall institutional investors.

Table 9. Robustness tests.

Variables	Dependent variables					
	(1) PC1		(2) PC2		(3) PC3	
SAIs	-0.0075		-0.0075		-0.0176	
	(-0.45)		(-0.44)		(-0.99)	
U-SAIs		-0.0148		-0.0174		-0.0213
		(-0.96)		(-1.14)		(-1.20)
L-SAIs		-0.0374**		-0.0304***		-0.0499***
		(-2.33)		(-2.70)		(-3.21)
IB-SAIs		-0.0391***		-0.0416***		-0.0506***
		(-3.25)		(-3.47)		(-3.98)
NIB-SAIs		0.1065**		0.1158**		0.0991*
		(2.05)		(2.14)		(1.84)
Reputation	-0.0134***	-0.0085**	-0.0150***	-0.0097***	-0.0175***	-0.0125***
	(-3.31)	(-2.33)	(-3.93)	(-3.03)	(-3.73)	(-2.99)
AA	-0.0251	-0.0175	-0.0274*	-0.0190	-0.0215	-0.0138
	(-1.63)	(-1.30)	(-1.74)	(-1.40)	(-1.42)	(-1.07)
FRI	-0.0304**	-0.0335**	-0.0297**	-0.0329**	-0.0329**	-0.0364**
	(-2.05)	(-2.20)	(-2.08)	(-2.20)	(-2.08)	(-2.22)
First revision from Allstar analyst	0.0137*	0.0138*	0.0054	0.0054	0.0098	0.0099
	(1.67)	(1.67)	(0.66)	(0.66)	(1.17)	(1.18)
Pre-downgrade dummy	-0.0398***	-0.0399***	0.0184**	0.0183***	-0.0468***	-0.0469***
	(-5.66)	(-5.68)	(2.63)	(2.62)	(-6.42)	(-6.43)
Intercept	0.0903**	0.0906**	-0.1758***	-0.1755***	0.0845*	0.0848*
	(2.07)	(2.07)	(-4.01)	(-4.00)	(1.90)	(1.91)
Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Number of obs.	126,644	139,654	126,644	126,644	126,644	126,644
R-squared	0.09	0.08	0.07	0.07	0.08	0.08

*Notes: This table reports regression coefficients on portfolio weight change (PC1), abnormal portfolio weight change (PC2) and difference in portfolio weight change on sample firms and control firms held by institutional investors (PC3) for affiliated analysts' recommendations revisions. PC1 is the dependent variable calculated as the change in portfolio weight of a stock in an institutional investor's portfolio from the beginning of a quarter, which is the quarter preceding the recommendation quarter, to the end of the quarter. PC2 is the dependent variable that equals to the portfolio weight change of a stock (PC1) less the change in the weight of that stock in the overall 13f institutional investors' portfolios. PC3 is the other dependent variable calculated as the difference in portfolio weight changes between sued firms and control firms that are non-sued, located in the same industry, and held by the same institution. Independent variables include dummy variables that represent whether a recommendation is issued by an analyst affiliated with a financial institution holding the covered firm (SAIs), an analyst issuing a recommendation on a firm is employed by an underwriter of the firm (U-SAIs), an analyst issuing a recommendation on a firm is employed by a bank lending to the firm (L-SAIs), and an analyst issuing a recommendation on a firm is independent of the firm. The independent analyst institutions are separated into institutions with (IB-SAIs) and without investment banking (NIB-SAIs). Control variables are detailed in Appendix A. t-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5% or 1% level, respectively.*

5. Conclusion

I examine whether investors and sell-side analysts exploit pre-release information by trading securities of firms covered by analysts prior to issuing stock recommendation revisions using data on financial lawsuits that induce potential negative impacts of a downward revision on stock price, thereby providing analysts with a strong incentive to produce and pre-release information. I find that IB-SAIs decrease their holdings in the recommended firms relative to non-SAIs during the quarter prior to downgrades issued by their analysts. Combined with evidence of stock performance, empirical results suggest that U-SAIs and IB-SAIs have superior information and execute transactions to benefit themselves at the expense of retail clients. Evidence of pre-release information trading is robust to controls for firm characteristics including size and book-to-market, past performance, institutional ownership, and analyst consensus and coverage.

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Conflict of interest

The author claims that the manuscript is completely original. The author also declares no conflict of interest.

Appendix

Table A1. Variable definitions.

Dependent variables	
HC1	The changes in the number of shares held by investors from quarter *t*-2 to quarter *t*-1, where quarter *t* is the quarter of analysts issuing the first downgrade (upgrade).
HC2	The percentage change in shares held by investors from quarter *t*-2 to quarter *t*-1, where quarter *t* is the quarter of analysts issuing the first downgrade (upgrade).
PC1	The portfolio weight change for a stock held by investors from quarter *t*-2 to quarter *t*-1, where quarter *t* is the quarter of analysts issuing the first downgrade (upgrade).
PC2	The portfolio weight change (PC1) less the change in the weight of the stock in the overall 13f institutional investors.
Independent variables	
SAI	Dummy variable, equal to 1 if an investor holds a firm covered by its sell-side analyst; 0 otherwise
U-SAI	Dummy variable, equal to 1 if a sell-side analyst is employed by an investment bank underwriting a firm in the past 3 years; 0 otherwise
L-SAI	Dummy variable, equal to 1 if a sell-side analyst issuing a recommendation on a firm is employed by a bank lending to the firm in the past 2 years; 0 otherwise
IB-SAI	Dummy variable, equal to 1 if a sell-side analyst with investment banking issuing a recommendation on a firm is independent of the firm; 0 otherwise
NIB-SAI	Dummy variable, equal to 1 if a sell-side analyst without investment banking issuing a recommendation on a firm is independent of the firm; 0 otherwise
Reputation	Investment bank's reputation based on the bank's market share in equity (debt) underwriting (%), calculated as a bank's aggregated total dollar amount in lead underwriting divided by all deal amounts in equity (bond) markets in a given year
FRI	Dummy variable, equal to 1 if a sell-side analyst issues the first downgrade (upgrade); 0 otherwise
AA	Dummy variable, equal to 1 if a recommendation is issued by an *Institutional Investor's* "All-America Research Team" analyst; 0 otherwise
IPW	Portfolio weight of a bank for a stock at the beginning of a quarter
TIO	Total percentage of institutional ownership of a firm at the beginning of a quarter
SIZE	Market capitalization at the beginning of a quarter
BM	Book-to-market ratio of a stock at the end of a quarter
MAR	past 6 months' (*t*-7 to *t*-1) cumulated returns minus the CRSP value-weighted index return
Analyst Coverage	Number of analysts following a stock
Analyst Consensus	The median level of consensus: 1 (Sell), 2 (Underperform), 3 (Hold), 4 (Buy), and 5 (Strong Buy)
Post-Rec	Dummy variable, equal to 1 if institutional trading takes place during the post-recommendation period

References

Aggarwal, R. (2000). Stabilization Activities by Underwriters after Initial Public Offerings. *Journal of Finance* 55,

1075-1103. https://doi.org/10.1111/0022-1082.00241
Brockman, P., Chung, D. Y., and Yan, X. (2009). Block Ownership, Trading Activity, and Market Liquidity. *Journal of Financial and Quantitative Analysis* 44, 1403-1426. https://www.jstor.org/stable/40505952
Carhart, M. (1997). On Persistence in Mutual Fund Performance. *Journal of Finance* 52, 57-82. https://doi.org/10.1111/j.1540-6261.1997.tb03808.x
Chan, K. W., Chang, C., and Wang, A. (2009). Put Your Money Where Your Mouth Is: Do Financial Firms Follow Their Own Recommendations? *Quarterly Review of Economics and Finance* 49, 1095-1112. https://doi.org/10.1016/j.qref.2009.02.002
Chemmanur, T. J., and Fulghieri, P. (1994). Investment Bank Reputation, Information Production, and Financial Intermediation. *Journal of Finance* 49, 57-79. https://doi.org/10.1111/j.1540-6261.1994.tb04420.x
Christophe, S. E., Ferri, M. G., and Hsieh, J. (2010). Informed Trading before Analyst Downgrades: Evidence from Short Sellers. *Journal of Financial Economics* 95, 85-106. https://doi.org/10.1016/j.jfineco.2009.02.004
Haushalter, D., & Lowry, M. 2011. When do banks listen to their analysts? Evidence from mergers and acquisitions. *Review of Financial Studies,* 24, 321-357. https://www.jstor.org/stable/40985851
Heidle, H., and Li, X. (2005). Information Leakage and Opportunistic Behavior before Analyst Recommendations: An Analysis of the Quoting Behavior of NASDAQ Market Makers. Unpublished working paper. https://www.fbv.kit.edu/symposium/10th/papers/Heidle_Li%20-%20Information%20leakage%20and%20opportunistic%20behavior%20before%20analyst%20recommendations%20An%20analysis%20of%20the%20quoting%20behavior%20of%20Nasdaq%20market%20makers.pdf
Hwang, H. (2019). Informed Trading of Mutual Funds: Evidence from Fund-Underwriter Relationships. *Financial Management* 48(1), 311-338. https://doi.org/10.1111/fima.12230
Hwang, H. (2021). Changes in Trading Behavior of Analyst-Affiliated Institutions: The Impact of The Global Analyst Research Settlement. *Financial Markets, Inst & Inst* 30(3), 65-83. https://doi.org/10.1111/fmii.12142
Irvine, P. J. (2004). Analysts' Forecasts and Brokerage-Firm Trading. *Accounting Review* 79, 125-149. https://www.jstor.org/stable/3203315
Irvine, P., Lipson, M., and Puckett, A. (2007). Tipping. *Review of Financial Studies* 20, 741-768. https://doi.org/10.1093/rfs/hhl027
Jacob, J., Rock, S., and Weber, D. P. (2008. Do Non-Investment Bank Analysts Make Better Earnings Forecasts? *Journal of Accounting, Auditing, and Finance* 23, 23-61. https://doi.org/10.1177/0148558X0802300104
Jordan, B. D., Liu, M. H., and Wu, Q. (2012). Do Investment Banks Listen to Their Own Analysts? *Journal of Banking & Finance* 36, 1452-1463. https://doi.org/10.1016/j.jbankfin.2011.12.010
Juergens, J. L., and Lindsey, L. (2009). Getting Out Early: An Analysis of Market Making Activity at the Recommending Analyst's Firm. *Journal of Finance* 64, 2327-2359. https://doi.org/10.1111/j.1540-6261.2009.01502.x
Ljungqvist, A., Marston, F., Starks, L. T., Wei, K. D., and Yan, H. (2007). Conflicts of Interest in Sell-Side Research and the Moderating Role of Institutional Investors. *Journal of Financial Economics* 85, 420-456. https://doi.org/10.1016/j.jfineco.2005.12.004
Mao, C. X., and Song, W.-L. (2012). Does Syndicate Relationship Affect Analysts' Incentive to Produce Information? Evidence from Recommended Firms' Securities Class Action Lawsuits. Unpublished working paper. https://dx.doi.org/10.2139/ssrn.2027209
Massa, M., and Rehman, Z. (2008). Information Flows within Financial Conglomerates: Evidence from the Banks-Mutual Funds Relation. *Journal of Financial Economics* 89, 288-306. https://doi.org/10.1016/j.jfineco.2007.10.002
Mehran, H., and Stulz, R. M. (2007). The Economics of Conflicts of Interest in Financial Institutions. *Journal of Financial Economics* 85, 267-296. https://doi.org/10.1016/j.jfineco.2006.11.001
Michaely, R., and Womack, K. L. (1999). Conflict of Interest and the Credibility of Underwriter Analyst Recommendations. *Review of Financial Studies* 12, 653-686. https://www.jstor.org/stable/2645961
Park, T.-J., Lee, Y., and Song, K. (2014). Informed Trading before Positive vs. Negative Earnings Surprises. *Journal of Banking & Finance* 49, 228-241. https://doi.org/10.1016/j.jbankfin.2014.09.016
Schultz, P. H., and Zaman, M. A. (1994). Aftermarket Support and Underpricing of Initial Public Offerings, *Journal of Financial Economics* 35, 199-219. https://doi.org/10.1016/0304-405X(94)90004-3