Do Institutional Investors Rely on Sell-Side Analysts? Evidence from Cash Flow Forecasts and Target Prices

By

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Intellectual Property Statement

The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

Dedication of this Thesis

To the love of my life, Raed.

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Abstract

Existing studies show contradicting results regarding the usefulness of sell-side analysts' forecasts to institutional investors. While institutional investors are the key customers of analysts' outputs (Ljungqvist et al., 2007) and they respond to it in a sophisticated manner (Malmendier and Shanthikumar, 2014), institutional investors tend to herd following analysts' stock recommendations (Brown et al., 2014) and institutional investors' response to analysts' target prices does not yield to any excess return in the future (Lin et al., 2016). Therefore, in this thesis, I build on this literature and complement it by examining several aspects of this relationship taking into consideration the heterogeneity in the level of informativeness between different types of institutional investors. More specifically, this thesis provides three pieces of empirical evidence on how institutional investors benefit from forecasts provided by sell-side analysts by answering the following three questions: Do cash flow forecasts contain incremental value to institutional investors? Do foreign institutional investors respond to target price revisions? Lastly, do institutional investors herd when using target prices?

The findings of this thesis show that, overall, institutional investors respond to cash flow forecasts and target price revisions. In addition, after splitting institutional investors based on their investment horizon, short-term institutional investors showed a greater response to cash flow forecasts compared with long-term institutional investors. Moreover, the results show that foreign institutional investors do respond to analysts' target price revisions, a behaviour which contributed positively to their profitability. Finally, the results show that institutional investors do herd following target price

revisions. After splitting the institutional investors based on their investment, the herding behaviour of short-term institutional investors positively impacted the future stock prices. Overall, the results of this thesis show that institutional investors benefit from sell-side analysts' forecasts.

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List of Abbreviations and Acronyms

American Stock Exchange	AMEX
Form 13F- Reports Filed by Institutional Investment Managers	13F
Institutional Brokers Estimation System	(I/B/E/S)
Institutional Investors All-America Research Team	All-star analyst
National Association of Securities Dealers Automated Quotations	NASDAQ
New York Stock Exchange	NYSE
Regulation Fair Disclosure	Regulation FD
The Centre for Research in Security Prices	CRSP
The U.S. Securities and Exchange Commission	SEC
United States	U.S

1 Introduction

Sell-side analysts disseminate information to market participants in the capital market. Among several market participants, analysts view institutional investors as their main clients (Schipper, 1991). Therefore, analysts' reports and outputs are tailored to meet the needs of the sophisticated large institutional investors (Brown et al., 2015). In addition to analysts valuing institutional investors, surveys show that institutional investors also value sell-side analysts' industry experience and access to management (Brown et al., 2016).Furthermore, institutional investors vote for the top analysts in each industry in what is called Institutional Investors All-America Research Team (All-star analysts). Therefore, institutional investors are responsible for the most prestigious ranking in the sell-side analyst profession (Soltes, 2014). In addition, institutional investors pay soft-dollars trading commission to brokerage firms for the research provided by sell-side analysts (Goldstein et al., 2009). Therefore, this thesis sheds light on the usefulness of the different outputs of sell-side analysts' reports to institutional investors.

The reason for this thesis focusing on institutional investors' trading is explained by the predominant role they play in the U.S. capital market. Institutional investors' ownership has increased drastically in the last thirty years (Amin et al., 2015). In particular, the percentage of shares owned by institutional investors accounted for 67% of total ownership in the U.S. stock market by the end of 2010 (Blume and Keim, 2012). Besides their high presence, institutional investors are perceived as sophisticated users of financial information in the markets. This is justified by their higher ability to trade in large blocks of stocks, and greater access to information resources (El-Gazzar, 1998, Hendershott et al., 2015). These resources include the in-house buy-side analysts in

addition to sell-side analysts. A number of academic studies examine the interaction between institutional investors and sell-side analysts.

For example, the academic literature has shown that institutional investors trade upon analysts' earnings' forecasts (Walther, 1997), analysts' stock recommendations (Chen and Cheng, 2006), and target prices revisions (Lin et al., 2016). In addition, large institutional investors appear to be more aware of analysts' biased behaviour in issuing overly optimistic recommendations, compared to small investors who naively follow the analysts' advice (Mikhail et al., 2007, Malmendier and Shanthikumar, 2007, Malmendier and Shanthikumar, 2014). Consequently, small investors generated significantly lower abnormal returns, compared to large investors who, being aware of the analysts' biased recommendations, placed comparatively more weight on the analysts' earnings forecasts (Malmendier and Shanthikumar, 2014).

Nevertheless, several aspects of the association between analysts and institutional investors have not yet been examined. More importantly, most of the aforementioned papers have not considered the heterogeneity in institutional investors' investment horizon and level of informativeness. Therefore, there is a lack of evidence whether different types of institutional investors respond differently to analysts' outputs and, more importantly, how this behaviour impacts stock prices.

1.1 Contribution of the Thesis

This thesis tests different aspects of the usefulness of sell-side analysts' forecasts to institutional investors in the U.S. By doing so, I shed the light on the interaction between two of the most informed users of financial information in the capital market and how

such interaction impacts the stock prices. Therefore, the objective of this thesis is to provide evidence of whether institutional investors benefit from sell-side analysts' forecasts. By doing so, I also provide recent evidence on the usefulness of sell-side analysts' reports after the well-documented criticism of their forecasts and behaviour. Accordingly, chapters 4, 5 and 6 provide unique evidence of the usefulness of analysts' forecasts to institutional investors.

1.1.1 Do Cash Flow Forecasts Contain Incremental Information to Institutional Trading Behaviour?

Chapter 4 tests whether institutional investors respond to analysts' cash flow forecasts. This chapter focuses on analysts' cash flow forecasts as the tendency to provide cash flow forecasts has increased significantly in the past two decades. This trend was explained by the increase in the demand of market participants when the earnings of the firm are of poor quality (DeFond and Hung, 2003). Since then, the usefulness of cash flow forecasts has continued to be debated among academics.

On the one hand, cash flow forecasts help analysts to forecast earnings with higher accuracy (Call et al., 2009). In addition, the accuracy of cash flow forecasts provides analysts with positive career outcomes (Pandit et al., 2012). Furthermore, cash flow forecasts are sophisticated forecasts that provide information to market participants (Call et al., 2013). Thus, these forecasts contribute to a decrease in the accrual anomaly (Mohanram, 2014, Radhakrishnan and Wu, 2014). On the other hand, cash flow forecasts seem to be naïve replications of earning forecasts and might be of limited value to investors (Givoly et al., 2009). Further, it is more difficult to forecast cash flow forecasts if earnings are of low quality, as this behaviour harms analysts' reputations.

Therefore, analysts will be less inclined to issue cash flow forecasts when firms' earnings are of poor quality (Bilinski, 2014).

Yet, the presence of cash flow forecasts contributed to a decrease in accruals mispricing as the presence of cash flow forecasts accompanied by earnings forecasts increased the awareness of investors to the accrual component (Mohanram, 2014, Radhakrishnan and Wu, 2014). However, to date, the academic literature has assumed that the incidence of cash flow forecasts would lead to a reduction in the anomaly and failed to produce evidence of how investors benefited from these forecasts to understand the accrual components (Ecker and Schipper, 2014). Therefore, Chapter 4 tests how institutional investors respond to this information, particularly with the presence of well-documented evidence that institutional investors responded to accruals signals properly and on a timely basis.

Firms with high levels of institutional ownership have accruals priced more accurately as institutional investors were able to differentiate between accrual and cash components, due to superior analytical abilities and greater access to information (Collins et al., 2003). Therefore, institutional investors were trading based on accrual anomaly (Lev and Nissim, 2006)

Thus, in Chapter 4 of this thesis, I argue that if cash flow forecasts accompanied with earnings forecasts are useful to predict the accruals, the institutional investors will respond to this information. I particularly investigate whether cash flow forecasts contain incrementally useful information above and beyond earnings forecasts for institutional investors. To do so, I examine the response of institutional investors to the presence of analysts' cash flow forecasts and the revisions in analysts' cash flow

forecasts. The initial results show that the presence of cash flow forecasts tempers the reaction of institutional investors to earnings revisions and, crucially, that institutional investors' trade in the same direction as analysts' cash flow forecasts revisions.

I also split institutional investors into different groups based on their investment horizon (short-term and long-term). The results show that only short-term investors respond to the revision of cash flow forecasts by adjusting their positions. Cash flow forecasts, therefore, moderate the trading of all institutional investors with respect to earnings revisions, but only short-term institutions trade significantly on cash flow forecast revisions. These results hold after controlling for earnings forecasts, stock recommendations, target prices, and sample selection bias. The study, therefore, provides evidence that cash flow forecasts influence the trading behaviour of sophisticated investors.

Other than cash flow forecasts, analysts' reports include target prices. Target price represents a direct investment signal with a concise horizon (Brav and Lehavy, 2003). Recently, Lin et al. (2016) have found that institutional investors respond to target prices. Nonetheless, this response does not contribute to their profitability. However, this might not be the case for foreign institutional investors who face information disadvantage in the capital market (Baik et al., 2013). Consequently, foreign institutional investors might benefit from the information provided by analysts' target price revisions. Therefore, in Chapter 5, I examine the foreign institutional investors' response to the target price revision and the profitability of such behaviour.

1.1.2 When Analysts Talk, Do Foreign Institutional Investors Listen?

In Chapter 5, I investigate whether foreign institutional investors earn future returns by responding to analysts' target price revisions. While I know that, overall, institutional investors trade upon target price revisions, this trading behaviour does not yield any excess returns (Lin et al., 2016). This might be explained by the argument that information provided by sell-side analysts is in the public domain and is, therefore, less profitable compared to trading on private information (Kacperczyk and Seru, 2007). The latter argument leads to the question of whether institutional investors with limited access to private information, and particularly foreign institutional investors, who are commonly regarded as the least informed of all groups, could benefit from sell-side analysts' target price revisions.

In general, prior studies have found that an increase in foreign institutional ownership results in negative future returns, caused by foreign institutional investors being less informed than their domestic counterparts (Baik et al., 2013). However, this informational disadvantage should be alleviated by following sell-side analysts who act as sophisticated information intermediaries in the market.

Therefore, in Chapter 5, I investigate whether foreign institutional investors earn future returns by responding to analysts' target price revisions. In line with the prediction, I find a positive and significant increase in foreign institutional ownership in response to a positive change in analysts' target prices, which leads to positive future excess returns. Foreign institutional investors can, therefore, alleviate their information

disadvantage and identify profitable trading opportunities by listening to sell-side analysts.

This chapter has built on Lin et al. (2016) by testing whether the lack of profitability of target price revisions can be explained by the argument proposed by Kacperczyk and Seru (2007) surrounding the profitability of public information. In addition, Lin et al. (2016) have also proposed that the lack of profitability of target price revisions to institutional investors might be explained by their overreaction to this information as a herd. Therefore, in Chapter 6, I empirically examine the proposition of Lin et al. (2016) concerning whether institutional investors herd when following analysts target price revisions.

1.1.3 Do Institutional Investors Herd when Following Analysts Target Prices?

Chapter 6 investigates whether institutional investors herd using target price revisions and its impact on stock prices. Target prices which show analysts' estimate of the firms' stock price in a 12-month horizon, have investment value and thus investors react to them (e.g., Brav and Lehavy, 2003, Asquith et al., 2005, Huang et al., 2009, Da and Schaumburg, 2011, Da et al., 2016). Recently, Lin et al. (2016) have found that institutional investors trade based on information contained in target price revisions, particularly, short-term institutional investors. However, they failed to find evidence that institutional trading based on target price revisions generate any abnormal future returns, suggesting that institutional investors might be overreacting as a herd to look prudent in the market. Lin et al. (2016) have built on the paper by Brown et al. (2014) to explain the lack of target prices profitability to institutional investors. Specifically, Brown et al. (2014)

document that mutual fund managers do herd when following analysts' stock recommendation resulting in negative impact on stock returns in the subsequent period. This is consistent with the prediction that overreacting caused by reputational herding destabilises stock prices and moves them away from fundamentals. Yet, Lin et al. (2016) have not examined the herding behaviour of institutional investors in responding to target price revisions. More importantly, the implications of the suggestion by Lin et al. (2016) that institutional investors might be overreacting and, therefore, destabilising stock prices, in the long run, have not been examined.

Institutional investors herd for several reasons; some of these reasons are informational-based while the others are based on career concerns and behavioural biases. A considerable number of academic papers has distinguished between the main drivers of institutional herding as informational or non-informational by examining the impact of such behaviour on subsequent returns (Koch, 2016). The herding is derived from information, if the institutional investors herding is followed by return continuation. Yet, if the herding behaviour is followed by return reversals, then it is derived from non-informational sources. Building on that, I investigate in this chapter whether institutional investors' herd when following target price revisions.

I find that, overall, institutional investors tend to herd based on target price revisions. Further, I split institutional investors into different groups based on their investment horizon (short-term and long-term). The results show that only short-term investors respond to the target price revision by selling together following downgrades and buying together following upgrades. These results hold after controlling for earnings forecasts, stock recommendations and other stock characteristics. Lastly, I test the impact of such

behaviour on stock prices. The results of the analyses show significant subsequent abnormal return in the subsequent quarter. However, I find no evidence of return reversal in the long-run. In fact, I find evidence of a positive impact of short-term institutional herding on current and subsequent stock prices. This can be inferred from the results that short-term institutional investors exhibit "investigative herding" behaviour as informed users of financial information and promote price discovery.

1.2 Thesis Outline

The thesis is organised as follows:

- Chapter 2 provides a theoretical background and a review of the literature discussing sell-side analysts' forecasts including the behaviour of sell-side analysts, the regulatory environment surrounding the analysts and the analyst's main outputs. Then, I discuss the institutional investors' behaviour in the capital market including the interaction between institutional investors and sell-side analysts, the role of institutional investors in the capital market and the institutional investors' behavioural biases.
- Chapter 3 provides an overview of the sample of the firms used in this study and high-level descriptive statistics and sample selection criteria to the data used in the thesis.
- Chapter 4 presents the first empirical chapter in this thesis that studies the usefulness of cash flow forecasts to institutional investors.

- Chapter 5 outlines the second empirical chapter in this thesis, which aims to test whether foreign institutional investors respond to target prices' revisions and the impact of such behaviour on subsequent stock prices.
- Chapter 6 then presents the third empirical chapter, which studies the herding behaviour of institutional investors when using target prices revisions.
- Chapter 7 gives a conclusion of this thesis which includes the background of the thesis, a summary of the main findings, as well as the policy implications of the study conducted. Further, Chapter 7 also represents the research limitations and provides recommendations for future research in the field.

2 Literature Review

2.1 Introduction

Due to the crucial role sell-side analysts play in the capital market, they have been subject to academic studies and regulatory reforms in the past three decades. The role the analyst plays as information intermediary made the research in this area massive. This chapter proceeds as follows: Section 2.2 reviews the literature related to the analysts' behaviour. Section 2.3 discusses the regulatory environment surrounding analysts' forecasts while section 2.4 discusses the main elements of the analyst's report. Lastly, section 2.5 reviews the academic research related to the institutional investors' behaviour and the interaction between institutional investors and sell-side analysts. By doing so, Chapter 2 provides the theoretical background for this thesis and provides the most recent studies relevant to the empirical chapters.

2.2 Analysts' Behaviour

The behaviour of analysts has become one of the main areas in sell-side academic research. In early research in this area Schipper (1991) argued that analysts are key sophisticated users of accounting information, and that they work as intermediaries to gather and process financial information and act on the behalf of investors. Thus, this paper recommended that future research should focus on the incentives that guided the behaviour of analysts and the whole decision-making process in order to issue stock recommendations and research reports.

Responding to Schipper (1991) argument, academic research studied analysts' behaviour extensively, and revealed that analysts' incentives to issue biased forecasts and stock recommendations affected the quality and usefulness of their research reports. This sub-section discusses the literature that examined the biased behaviour of the analysts, the analysts' incentives to enhance their reputation and the analysts' herding behaviour.

2.2.1 Biased Recommendations to Attract Investment Bank Business

It has been argued in the literature that investment banks' underwriting relationships and trading commissions were the main reasons behind optimistically biased recommendations (Corwin et al., 2017). Investment banks compete to obtain underwriting business from specific firms and, hence, analysts face a conflict of interest that may reduce their neutrality (e.g., Dugar and Nathan, 1995, Lin and McNichols, 1998, Corwin et al., 2017). Academics and, more importantly, regulators have both expressed concern over the conflict of interest faced by analysts in promoting their investment bank businesses. In 2003, the Global Research Analyst Settlement was reached between the SEC, NYSE, NASD, New York Attorney General, and North American Securities. According to the settlement, ten (later twelve) of the largest investment banks were required to pay a fine of approximately $1.4 billion in the Global Research Analyst Settlement in 2003.[1] In the same year, the U.S. Securities and Exchange Commission (SEC) also approved NASD Rule 2711 and NYSE Rule 472, both of which were

[1] SEC. 2003. Ten of Nation's Top Investment Firms Settle Enforcement Actions Involving Conflicts of Interest Between Research and Investment Banking. [Press release]. [Accessed 13 May 2015]. Available from: http://www.sec.gov/news/press/2003-54.htm.

directed to investment banks and brokerage houses in the industry, and attempted to increase analysts' independence by separating the investment banks' business and research departments. They prohibited research analysts' compensation to be based on investment bank business and prohibited investment banks from directly supervising research analysts.[2]

Many studies were conducted before the introduction of the regulatory reforms. For example, Cliff and Denis (2004) found that positive analyst coverage was associated with under-pricing of initial public offerings (IPOs) in the period between 1993 and 2000. They specifically found the quantity of coverage (frequency of coverage after the underwriting) and type of recommendation (95% of recommendations were buy or strong buy recommendation) were strongly correlated with IPO under-pricing. This study showed that issuers of IPO indirectly paid for All-star analysts' coverage through under-pricing of IPO to the underwriting banks. They also found that the issuing company would often change their underwriting investment banks in the subsequent seasoned Equity Offerings, if the All-star analysts did not provide the expected coverage for the following year.

Further to this, O'Brien et al. (2005) supported the idea that sell-side analysts face a conflict of interest that could compromise their objectivity when their employers are involved with underwriting. The study compared the speed of affiliated analysts (analysts whose employers had existing underwriting relationships with the covered firms) and unaffiliated analysts in responding to bad news. Their comparison between the analysts who shared companies in the time frame spanning between 1994 and

2 SEC. 2003. NASD and NYSE Rulemaking. [Press release]. [Accessed 13 May 2015]. Available from: https://www.sec.gov/rules/sro/34-48252.htm.

2001, shows that when compared to unaffiliated analysts, affiliated analysts were faster in issuing good news or upgrading from a Hold recommendation and slower in issuing bad news or downgrading from a Buy or Hold recommendation. Further, they found that, after the IPO, affiliated analysts issued their recommendation earlier than unaffiliated analysts, and unaffiliated analysts were more likely to drop or stop their coverage of companies in the two years following IPOs.

Yet, Ljungqvist et al. (2006) argued that analysts' attempts to attract potential underwriting firms by issuing optimistically biased recommendations would not help analysts to increase the probability of convincing their potential customers. The study also showed that the reputation of analysts, as defined by their inclusion as an All-star analyst or by working in a successful firm, decreased the aggressive behaviour of the analysts. Chen and Jiang (2006) confirmed the biased behaviour of analysts and found that their optimistic bias increased when they were covering heavily traded stocks which might lead to high potential trading commissions. This study also found that analysts were more optimistic if their employers had plans to underwrite for the firms they cover.

Besides attracting business to investment banks, analysts' reliance on the companies' management as a primary source of information was a main reason to justify the biased behaviour by analysts. Hence, analysts are accused of issuing a favourable recommendation and beatable earnings forecasts to please the management of the firms they followed.

2.2.2 Biased Behaviour to Maintain Good Relationships with Management

Sell-side analysts rely on management as a key source of information to make their forecasts (e.g., Francis and Philbrick, 1993, Lim, 2001) and, accordingly, academic researchers have found that analysts biased recommendations and forecasts are associated with their attempts to please management in order to obtain private information (Chen and Matsumoto, 2006). Responding to this evidence, the U.S. Securities and Exchange Commission (SEC) issued the Regulation Fair Disclosure (Regulation FD) in 2000 to limit analysts' access to private managerial information (Goff et al., 2008).[3] Regulation FD prohibited management material disclosure to specific analysts in an attempt to increase the discipline of the analysts. The following subsections will shed light on a number of academic studies which discuss two well-documented analysts' activities for pleasing the management. These activities are favourable stock recommendations and beatable earnings forecasts.

2.2.2.1 Favourable Stock Recommendation

It has long been known that analysts are likely to issue favourable recommendations in order to elicit private information from firms' management. For example, Chen and Matsumoto (2006) studied the effect of Regulation FD on favourable recommendations in order to access private management information. The sample of this study is from the Institutional Brokers Estimation System (I/B/E/S) in the period between 1993 and 2002. The private information was hard to measure or observe, thus, this study used

[3] Regulation FD is discussed in section 2.3.

earnings forecast accuracy to proxy the private information that analysts obtained after controlling other variables that are shown to affect this accuracy. It concluded that favourable recommendations improved the analyst's access to management in the pre-Regulation FD period. Further, they failed to find significant evidence that the introduction of Regulation FD decreased this behaviour.

Moreover, Mayew (2008) confirmed the limited role of regulation FD by arguing that management discrimination between analysts still existed after the SEC passed Regulation FD. This study specifically argued that management rewarded analysts with favourable recommendations by permitting them to ask questions in conference calls and that there is a strong association between an analyst's participation in conference calls and the favourableness of the recommendations they issued, and that the analyst's choice to downgrade the recommendations was linked to subsequently reduced access during conference calls.

2.2.2.2 Beatable Earnings Forecasts

The negative impact of falling short of analyst's predictions has been documented in the academic literature (Skinner and Sloan, 2002), along with the significant positive impact for firms which do so (Bartov et al., 2002). Therefore, academic scholars have explained biased earnings forecasts by analysts' incentive to maintain good relationships with management. Prior research has proposed that this affects the pattern of the earnings forecasts. Specifically, it was proposed that they give optimistic forecasts at early stages of the year but pessimistic forecasts in the last quarter, with the intention of giving managers the opportunity to beat their forecasts.

For example, Bartov et al. (2002) documented a significant market premium for firms which beat analysts' forecasts. This study found that when firms failed to beat the quarterly earnings forecasts, the penalty for falling short was larger than the reward for meeting or exceeding the negative expectations of analysts, suggesting that investors reward firms whose earnings meet or beat analysts' forecasts and penalise those who fall short. In the same study, it was mentioned that analysts' forecasts for the earlier quarters tended to be more optimistic, while the last quarter forecasts tended to be more pessimistic.

Moreover, Richardson et al. (2004) documented optimistic earnings forecasts early in the year being 'walked down' to beatable pessimistic earnings forecasts by analysts, especially in the existence of managerial incentives (managerial option exercise and stock sales). They argued that management misguided analysts to issue beatable earnings forecasts when insider trading is allowed only in the period immediately following an earnings announcement and, hence, the management would benefit the most if the analysts' issued pessimistic forecasts as surprise positive earnings would be announced to the market. The empirical evidence showed an increase in the probability of issuing pessimistic earnings forecasts prior to earnings announcements from 54% to 66% for average firms with insider selling.

Lastly, Libby et al. (2008) confirmed analysts' biased behaviour to obtain a good management relationship by 'walking down' to beatable earnings forecasts using experimental study, finding that the presence of good relationships with the management increased this biased behaviour. In this experimental study, the analysts were asked about the benefits they gained from maintaining good relationships with managers, to which

the main answer was access to informal information through conference calls. Moreover, this study argued that Regulation FD did not eliminate the consequences of the analyst-management relationship.

In conclusion, there is contrasting evidence in the literature which shows that analysts have incentives both to use, and to avoid, bias in their earnings forecasts and recommendations.

2.2.3 Reputation of the Analyst

Prior literature has proposed that one possible way to decrease the opportunistic behaviour of analysts is their reputation concerns. Early evidence was given by Stickel (1992), who documented that All-star analysts had superior performance when measured in three dimensions: accuracy, regularity of the revision, and market response to analysts' forecasts.

Jackson (2005) confirmed the prior results of the effect of reputation using Australian data for the period between 1992 and 2002. The study measured analysts' reputations by their rank in a leading Australian analyst survey. The study found that highly reputable analysts generated higher trading commissions in the long run, while analysts who jeopardised their reputation for short-term trading commissions damaged their reputation in the long run. Thus, analysts are motivated to improve the accuracy of their forecasts. Finally, this study argued that separating investment banks' business and analysts' research will not reduce the optimistic forecasting of analysts as the analysts will simply replace the investment banks' business with trading commissions offered by institutional investors. Further, Fang and Yasuda (2009), using a large sample spanning

between 1983 and 2000, confirmed that analyst reputation, measured by All-star analyst, was an effective tool in combatting the existing conflicts of interest. They found that the reputation of analysts, as measured by All-star analyst, played a key role in the period of peak underwriting and its related compensations.

Moreover, Ljungqvist et al. (2006) confirmed that the analysts ranked as All-star analysts were more concerned with their reputation and were, therefore, less likely to engage in aggressive behaviour in order to obtain investment bank business. This study proposed that analysts optimistically biased their stock recommendations for potential underwriting firms. Yet, this biased behaviour did not increase the chances that investment banks would convince potential customers to win the underwriting mandate. Further, Groysberg et al. (2011) asserted the benefits of good reputation and found that All-star ranked analysts earned a 16% higher compensation premium than peers without the ranking. This study found that accurate stock recommendation affected the compensation of the analyst. Yet, this study failed to find an association between the accuracy of earnings forecasts and compensation. The reputation concerns usually led to different behavioural biases such as herding behaviour.

2.2.4 Analysts' Herding

Numerous studies into analysts' behaviour have mentioned that analysts are irrational and usually herd when issuing their forecasts and recommendations. The phenomenon of herding occurs when analysts are subject to peer pressure and adjust their predictions in order to shift them closer to the norm (Mensah and Yang, 2008). It is argued in the herding literature that analysts deviate from their own interpretations and expectations to issue forecasts closer to consensus and that this behaviour is typically guided by an

analyst's concerns about their career and reputation (e.g., Trueman, 1994, Olsen, 1996, Hong et al., 2000).

It has long been known that analysts exhibit herding instincts (Trueman, 1994, Olsen, 1996). Subsequently, Hong et al. (2000) studied a large sample of 8,421 security analysts, who issued earnings forecasts in the period between 1983 and 1996. In this study, it was proposed that the main reason behind analysts' herding is their career concerns and, hence, analysts' experience is associated with their herding behaviour. Their results indicated that it was more likely for less experienced analysts (younger) to be fired as a result of bold forecasting, when compared with more experienced (older) analysts. Therefore, they argued that analysts with less experience were more likely to follow the consensus (Herd) due to concerns about their continued profession compared with more experienced analysts. In addition to herding, they found that younger analysts were slower both to release, and to revise their forecasts.

Further to this, Clement and Tse (2005) extended Hong et al. (2000) work by examining the characteristics of analysts who issued bold forecasts. This study first classified the earnings forecasts as either bold or herd, then tried to determine the characteristics of analysts who issued bold forecasts. It found that analysts with higher prior accuracy, bigger brokerage house size, fewer industries followed and greater experience were more likely to issue bold forecasts. Therefore, the study suggested that analysts' characteristics do affect their ability to issue bold forecasts. In contrast with preceding papers, Chen and Jiang (2006) and Bernhardt et al. (2006) concluded that analysts did not herd; their results indicated that analysts biased their forecast based on private information as they place more weight on this private information, concluding

that they issued biased forecasts based on their private information but they did not herd in the market.

Regulatory changes provide the academic motivation for the study of analysts' resultant behavioural changes. For example, Arya et al. (2005) claimed, using mathematical models, that Regulation FD would lead to an increase in the amount of public information and decrease selective disclosure, which would lead to increased herding in the market. They argued that private information helped analysts to differentiate themselves and enrich the overall information environment, proposing that regulation FD has negative consequences on the overall information environment, and actually harmed investors rather than helping them, but without empirical analysis of financial data. As a counterpoint, Mensah and Yang (2008), using several empirical models, tested herding using two different measures before and after regulation. They failed to find evidence that Regulation FD increases herding behaviour and argued that regulation increased the level of public disclosure available for investors and, thus, analysts would make more effort to differentiate their forecasts. Finally, Jegadeesh and Kim (2009) confirmed analysts' herding behaviour using a sample of stock recommendations from 1993 to 2005. They documented a stronger market reaction to bold stock recommendations and proposed, based on this result, that market participants were aware of analysts' propensity to herd.

In conclusion, the extensive research on analysts biased behaviour, along with the scandals surrounding the dot.com bubble in the early 2000s, increased the regulatory bodies' attention of this behaviour and led to several regulations which changed the

environment in which the analysts work. These regulations along with the main academic studies which examined its impact are presented in the following sub-section.

2.3 Regulatory Environment

The regulatory agencies responded to the documented biased behaviour of analysts, in addition to other events, which also affected the analysts' regulatory environment, including the well-known collapse of Enron, Arthur Anderson, WorldCom, and the dot.com bubble in the late 1990s and early 2000s. Subsequent to these events, the regulatory environment changed and, predominantly in early 2000, several regulations were approved to increase the objectivity of analysts, return confidence to the capital market, and protect investors.

In the early 2000, the SEC addressed the problem of selective disclosure of private data to analysts. The main consequences of this selective disclosure are optimistically biased recommendations resulting from private information given by management to selected analysts or institutional investors and, therefore, lower overall confidence in the market. Therefore, the SEC implemented Regulation FD in 2000, which attempted to prevent insider information passing to specific analysts. Moreover, Congress approved the Sarbanes-Oxley act in 2002, whose section 501 contained a new Section 15D of the 34 Act and forced the SEC to adopt new rules to address the conflict of interest of security analysts that recommend stocks to investors. These new rules aimed to increase objectivity and enhance the reliability of information given to investors.

Following calls in 2003, the SEC addressed concerns regarding the involvement of the largest investment banks in the conflict of interest debate, of which ten paid

approximately $1.4 billion in fines as part of the Global Research Analyst Settlement. The involvement of large banks was surprising, since both game and agency theory had suggested that reputable investment banks should preserve their reputation in the long run and not engage in biased behaviour (Fang and Yasuda, 2009). As a result, the Global Research Analyst Settlement legislated, with the approval of Rule 2711 and NYSE Rule 472, commonly referred to as the 'self-regulatory organisation rule'. The Global Settlement and Self-Regulatory Rules emphasised the separation of research and investment bank businesses to reduce the effects of conflicts of interest and restore confidence in the investment market.

These regulatory changes motivated a number of studies to examine its effect on the accuracy of forecasts, the information content of stock recommendations, the reliance on public disclosures and changes in analysts' behaviour (e.g., Heflin et al., 2003, Bailey et al., 2003, Ertimur et al., 2007, Mayew, 2008, Goff et al., 2008, Barniv et al., 2009). Bradshaw (2009) mentioned that adopting new regulations provided an interesting opportunity for academic literature to re-examine the behaviour of market participants. The following sub-sections will discuss some of the key papers that explored these effects.

2.3.1 Impact of Regulation FD

Sell-side analysts are information intermediaries who gather and process information in order to give an opinion on the stocks. One recognisable way of gathering information is by obtaining information from management (e.g., Lees, 1981, Francis and Philbrick, 1993, Lim, 2001). However, the SEC raised concerns about the inappropriate use of important private information by management, which might affect the objectivity of

analysts. Previous research addressed biased behaviour resulting from analysts' attempts to maintain a good relationship with management (e.g., Das et al., 1998, Chen and Matsumoto, 2006). This behaviour resulted in optimistic recommendations that misled less sophisticated investors (Malmendier and Shanthikumar, 2007) and, hence, in an attempt to improve the information environment, increase fairness, transparency and confidence of individual investors in the market, the SEC issued Regulation FD in 2000. The main consequence of this regulation was to limit analysts' access to private managerial information (Goff et al., 2008).

Several aspects of the post-regulation environment have been studied by multiple academics. For instance, Barniv et al. (2009) examined the role that Regulation FD played in improving analysts' outputs and decreasing their biased behaviour. They studied the association between earnings forecasts and stock recommendations using valuation models, as had previously been done by Bradshaw (2004) to examine the effect of regulation on the discipline of the analysts. Based on a large sample in the period between 1993 to 2005, this study found that the negative relationship between residual income as valuation model and stock recommendation - documented previously by Bradshaw (2004) - and justified by the biased behaviour of analysts- diminished after the introduction of Regulation FD. This study found that the relationship between residual income and future returns increased after regulation, whereas stock recommendations' association with future return remained negative, showing that although the legislation reduced the analysts' biased behaviour, it did not eliminate it entirely. However, this study found that long-term growth and price to earnings heuristics continued to have positive but weaker associations with the recommendations in the period after implementing Regulation FD.

While regulators and scholars expected regulation FD to improve sell-side analysts' outputs, analysts argued that this implementation would have a negative impact on the information environment as it prohibited their main guidance for earnings forecasts (Heflin et al., 2003). Thus, several studies examined the effect of Regulation FD on the information environment. For instance, Arya et al. (2005) argued that Regulation FD might have an unintended effect of increasing analysts herding, arguing that preventing selective disclosure might reduce the overall information in the market. In contrast with the preceding paper, both Heflin et al. (2003) and Bailey et al. (2003) documented an increase in voluntary disclosure subsequent to regulation FD. Heflin et al. (2003) tested using a timeframe spanning from the second quarter of 1999 to the second quarter of 2001 and could not find evidence that the accuracy of earnings forecast changed, or that Regulation FD decreased the overall information in the market.

Moreover, Bailey et al. (2003) proposed that the decrease in private information motivates managers to increase public information. This decrease in privacy was shown to increase variation in but not the accuracy of forecasts and, hence, they suggested that it became harder for analysts to forecast after regulation FD. They also found an increase in trading volume around the recommendations justified by investors' reaction to differential opinions in the stock recommendations. Mohanram and Sunder (2006) confirmed Heflin et al. (2003) result that Regulation FD did not reduce the overall quality of information available. Furthermore, they showed an increase in the precision of analysts' specific information. Finally, the study found that analysts shifted their coverage for firms that were less covered in the period pre-Regulation FD in an attempt to differentiate themselves. In addition, Kross and Suk (2012) found that public disclosure items (earnings announcements, management forecasts and conference calls) were

enhanced in speed, regularity and forecast revision in the period after Regulation. They also documented that both cross-sectional forecasts' dispersion and consensus forecasts' errors diminished more in the period following the introduction of Regulation FD.

Other studies, however, have claimed that the introduction of Regulation FD did not block analysts' access to management. For example, Chen and Matsumoto (2006) studied the effect of Regulation FD on the relationship between favourable recommendations and access to management to obtain private information and found that favourable recommendations were related to more accurate forecasts in the subsequent quarter, concluding that favourable recommendations improved the analysts' access to management in the pre Regulation FD period. They failed to find significant evidence that the introduction of Regulation FD decreased this behaviour.

Mayew (2008) argued further that the reform also failed to address workplace discrimination, and that the management rewarded analysts who issued favourable recommendations by allowing them to ask more questions during the conference calls. The study found a strong correlation between the analysts' participation in conference calls and the favourableness of the recommendations they issued, while analysts' who downgraded their recommendations received less access to conference calls. Finally, this study mentioned that the reputation of analysts, measured by All-star ranking, moderates this relationship, and that reputable analysts had more contact during conference calls without attempts to please management. Moreover, Soltes (2014) showed that "off-line" interactions between managers and analysts still existed. He examined private data for a large New York Stock Exchange trading firm and found that analysts interact with managers on average 75 times per year, with the majority of these interactions being

phone calls. Moreover, Brown et al. (2015) confirmed that analysts remain reliant on private information - especially phone calls - in the post-Regulation FD period.

The effect of the reform studied extensively in the analysts' literature, with multiple opinions held over the magnitude of changes in the behaviour of analysts and management after regulation needs further discussion before the effectiveness of Regulation FD can be determined.

2.3.2 Impact of Global Research Analyst Settlement and Self-Regulatory Rules

To complement the Regulation FD Act in 2000, investigations led by the New York Attorney General, Elliot Spitzer, led to the Global Research Analyst Settlement between the SEC, NYSE, NASD, New York Attorney General, and North American Securities, with ten (later twelve) of the largest investment banks required to pay approximately 1.4 billion dollars in fines in 2003.[4] The involvement of ten of the largest banks and one All-star ranked analyst was surprising, since the reputation of analysts and investment banks was expected to play an important role in mitigating the effects of conflicts of interest (Fang and Yasuda, 2009).

Along with the Global Research Analyst Settlement, the SEC also approved NASD Rule 2711 and NYSE Rule 472 - commonly referred to as the "Self-Regulatory Organisation Rules". The rules were imposed to separate the research departments from the investment banking departments and not only involved banks but also all firms that

[4] SEC. 2003. Ten of Nation's Top Investment Firms Settle Enforcement Actions Involving Conflicts of Interest Between Research and Investment Banking. [Press release]. [Accessed 13 May 2015]. Available from: http://www.sec.gov/news/press/2003-54.htm.

conduct security research. The rules were designed to build a Chinese wall between the two arms of the investment banks. It prohibited research analysts' compensation to be based on investment bank business, prohibited investment banks' direct supervision of research analysts, prohibited analysts from attending pitches or road shows and prohibited non-research personnel from reviewing analysts' work (except for factual accuracy). The new rules also increased the level of disclosure regarding conflicts of interest, such as analysts' financial involvement in subject companies' securities, the investment banks' receipt of compensation from a covered company, and analysts' occupation as officers or directors in research subject companies.[5]

Ertimur et al. (2007) - using a sample from 1993 to 2004 - found a stronger relationship between the accuracy of earnings forecasts and the profitability of recommendations after the Global Research Settlement and Self-Regulatory rules. Their results indicated that buy and hold recommendations were more informative in the period after regulation, both for affiliated and non-affiliated analysts. Moreover, Chen and Chen (2009) used the methodology previously applied by Bradshaw (2004) to study the relationship between stock recommendations and earnings valuation models with data from between 1994 and 2005. Bradshaw (2004) had previously found that analysts relied on heuristics like price to earnings valuation models, and proposed that NASD Rule 2711 played an important role in decreasing an analyst's biased behaviour as the relation between stock recommendations and residual income valuation models – previously studied by Bradshaw (2004) - were stronger after implementing the rule. The

5 SEC. 2003. NASD and NYSE Rulemaking. [Press release]. [Accessed 13 May 2015]. Available from: https://www.sec.gov/rules/sro/34-48252.htm.

study proposed that NASD Rule 2711 contributed to improving the affiliated analysts' behaviour and reduced the effect of conflicts of interest.

In contrast, Kadan et al. (2009) concluded that the overall usefulness of the recommendations decreased after the regulatory reforms, showing that the frequency of optimistic recommendations was reduced after the analyst research settlement. In addition, the pessimistic recommendations frequency increased but their usefulness decreased. They also showed that affiliated analysts remained reluctant to issue pessimistic recommendations, even after the settlement. In addition, Boni and Womack (2003) stated that the Global Research Settlement had a negative impact on the overall information environment, that led to costs-cutting and discontinued coverage of some companies, which might affect the speed and quality of the information in the market.

Lastly, by comparing the Global Research Settlement with Self-Regulatory Rules, Corwin et al. (2017) proposed that the punitive actions conducted on twelve investment banks subject to the Global Research Settlement were more powerful than general Self-Regulatory Rules. They studied affiliated analysts' stock recommendations before and after the settlement and found that the settlement led to more consistent and powerful changes in the targeted banks.

Much of the past literature has honed in on a single variable in the system, at the expense of others, whereas what is truly needed is a comprehensive analysis. Some papers have focused on Regulation FD while others have focused on the Global Settlement and the Self-Regulatory Rules. However, Bradshaw (2009) mentioned that studying the effect of specific regulatory actions is not possible in empirical studies since most of the changes were applied in the same period and affected the analysts' overall

research environment and behaviour. Moreover, results and opinions regarding the effect of regulations remain contradictory, and while some research papers showed improvement others found limited improvements. Table 2-1 summarises the key regulations within the sell-side analysts' profession in the early 2000s.

Table 2-1: Summary of the Key Regulations in the Sell-side Analysts' Profession

Regulation	Date	Short Explanation
Regulation FD	2000	Regulation fair disclosure aimed to promote the full and fair disclosure by prohibiting any selective disclosure from management to specific analysts or institutional investors. In case of the issuance of any material non-public information, the issuer must make the information public simultaneously for intentional disclosure and promptly for non-intentional disclosure
Sarbanes-Oxley Act Section 501	2002	Call for SEC to provide rules within one year to enhance the objectivity of security analysts and reliability of the information provided to investors. SEC should also adopt rules to disclose and restrict the conflicts of interest that analysts previously faced.
Global Research Analyst Settlement	2003	Global settlement agreement between SEC, NASD, the NYSE, the New York State Attorney General and ten of the largest investment banks to pay a $1387.5 million fine and set rules to curb the consequences of conflicts of interest.[6]
Self-Regulatory Rules (Rule 2711 NYSE Rule 472)	2003	Rules to separate the research team from the investment bank business. It also required a "quiet period" in which investment banks are not allowed to issue reports for companies for which they also act as managers for the IPO. In addition, it required analysts to increase the level of disclosure required to declare any conflicts of interest.
Regulation Analyst Certificate (Regulation AC)	2003	Analysts must provide a statement clarifying that the views stated in the research reports are their own personal views and other statements to clarify that their compensation is not or will not be affected by the research report. If their compensation is or will be affected by the recommendation or any part of research the statement must include the source, amount, and purpose of such compensation, and further disclose that it may influence the recommendation in the research report

[6] SEC. 2003. Ten of Nation's Top Investment Firms Settle Enforcement Actions Involving Conflicts of Interest Between Research and Investment Banking. [Press release]. [Accessed 13 May 2015]. Available from: http://www.sec.gov/news/press/2003-54.htm.

2.4 Main Elements of Sell-Side Analysts' Reports

An analyst's report is defined as:

> *"The culmination of a process that includes the collection, evaluation, and dissemination of information related to a firm's future performance".*
>
> (Asquith et al., 2005, p.246)

Sell-side analysts conduct sophisticated analysis in order to write an equity research report. The major outputs in this report are the earnings forecast, stock recommendation, target prices, supplementary forecasts and other quantitative and qualitative information. In recent years these have been accompanied by cash flow forecasts (Givoly et al., 2009).

For decades, analysts' equity research reports and their outputs were a key area in accounting research. This sub-section briefly discusses discusses the main elements of a sell-side report and research conducted in this field.

2.4.1 Earnings Forecasts

Much accounting research has been undertaken into sell-side analysts' earnings forecasts. Early research on earnings forecasts documented the superiority of the analysts' earnings forecasts to time series models in predicting earnings (e.g., Fried and Givoly, 1982, Brown et al., 1987). The former papers suggested that forecast earnings require acquiring and processing information such as macroeconomic data, industry variables and management forecasts on a timely basis, in contrast with naïve time series models. Since then, earnings forecasts have become a key component of capital market research.

Earnings forecasts were used as a proxy for market expectations of future earnings while earnings forecast errors were considered a measure of the unexpected portion of earnings. Under the informational efficient market hypothesis, the unexpected portion of earnings (forecasts' errors) should lead to stock price reactions (Bradshaw, 2011). This has resulted in academic divergence into three schools of thought: First, a branch studied the reaction of stock prices in response to the issuance of earnings forecasts. Second, a branch studied the analysts' efficiency in obtaining and processing public information. Third, a branch considered the accuracy of forecasts (Bradshaw, 2011).[7] These are discussed below.

2.4.1.1 Analysts' Ability to Forecast Earnings Accurately

Following the documented evidence that analysts' forecasts were superior to time series models, academic research moved to identify whether specific analysts had different abilities to forecast accurately, but early evidence failed to corroborate this hypothesis (e.g., Richards, 1976, Brown and Rozeff, 1980, O'Brien, 1990). The prior studies could not find evidence that there is a difference in the analysts' ability to accurately forecasts earnings.

Conversely, Stickel (1992) proved the superiority of All-star analysts, arguing that they were leaders in the market with higher reputation and better compensation and that, specifically, All-star analysts were more accurate, revised their forecast more frequently and caused a larger market response. Sinha et al. (1997) confirmed that differences among analysts in their ability to forecast accurately existed after controlling the timing

[7] Schipper (1991), Brown (1993) and Ramnath et al. (2007) did an extensive review of the early studies in the analysts forecast and the mentioned streams of the studies.

of their forecasts. The importance of this research triggered the belief that identifying more accurate analysts enables investors to identify more profitable stocks and make abnormal returns.

However, Clement (1999) argued that while Stickel (1992) and Sinha et al. (1997) found that differences among analysts existed, the main reasons behind these differences were ambiguous. Clement (1999) argued that the accuracy of analysts depends on a number of factors which proxy analysts' abilities, resources available and job complexity. The variables were: company-specific experience, general experience, number of companies followed, number of industries followed, and size of brokerage house. Based on I/B/E/S data in the period between 1983 and 1994, this study found that forecast accuracy was positively correlated with general and specific forecasting experience, and employer size, while negatively associated with the number of firms and industries followed. Brown (2001) compared the Stickel (1992) and Clement (1999) models in terms of predictive power using quarterly and annual forecasts and found no statistical difference between them, though Clement (1999) complicated model slightly outperformed Stickel (1992) simpler model. In summary, this study concluded that practitioners' reliance on past earnings forecasts accuracy was appropriate.

Once research had documented the superior analysts' ability to forecast earnings accurately, academic research focused on the analysts' attributes that could affect the accuracy and mitigate analysts' biased behaviour dilemma.

2.4.1.2 Analysts' Attributes and Earnings Forecast Accuracy

Analysts' specific characteristics affect the ability to forecast accurately. One of the influential analysts' characteristics is the analysts' reputation. Due to its extreme influence on an analyst's compensation, ranking, and career, a proposed way to reduce biased earnings is the effect on their reputation. For example, Jackson (2005) empirically showed that the reputation of analysts is enhanced by more accurate forecasting. Further, an analyst with a good reputation would generate higher trading commissions in the long-run, whereas a biased analyst would generate short-run trading commissions, but may ruin their reputation in the long run. Therefore, the study proposed that the analyst was self-motivated to improve the accuracy of their forecast. In addition, Ljungqvist et al. (2006) confirmed that All-star analysts were more concerned with reputation and less likely to engage in aggressive behaviour to obtain underwriting clients for their employers.

Further, Fang and Yasuda (2009) found that analysts' reputation affected the accuracy of the forecast. An analyst's reputation is an important tool in the cases where there was a conflict of interest, and has proved effective in the period of peak underwriting and its related compensation. However, the banks' reputation alone was not an effective mechanism to decrease bias. These results confirmed the appropriateness of the actions which were taken by the Securities and Exchange Commission (SEC) in 2003.

Hugon and Muslu (2010) focused on another attribute of the analysts which affects the usefulness of earnings forecasts. This study specifically argued that the more conservative analysts were, the better they were for the market in general. They studied annual earnings forecasts from between 1989 and 2005 from I/B/E/S and showed that

the behaviour of the conservative analyst was measured by the way the individual reacted to the good and bad news. They found a stronger market response to conservative analysts in the presence of institutional investors. Finally, they found that conservative analysts were more experienced, employed in large investment houses and awarded by institutional investors.

Overall, the earnings forecast process was overemphasised in sell-side analysts' academic research, which led academics to criticise it, since it is one of the steps for analysts to reach their main product – the stock recommendation.

2.4.2 Stock Recommendations and Earnings Forecasts

The significant attention that earnings forecast received over the stock recommendation in academic research was criticised by early research in this area. Schipper (1991) was the first to criticise the focus on the statistical properties of earnings forecast. This study argued that the final product of the analyst is a stock recommendation, and that earnings forecast should only be one step towards generating a stock recommendation. In addition, Brown (1993) criticised the inconsistency in analysts' products by arguing that the most accurate forecasts should lead to more useful stock recommendations and called on future research to understand the main reasons behind the conflict in the past literature.

Bradshaw (2004) used two separate models to study correlations between earnings forecasts and stock recommendations – the price to earnings model, and analysts' projections long term growth model - for the period between 1994 and 1998. This study linked the calculated valuation models to analysts' stock recommendations to examine if

the analysts used sophisticated residual income models to give an opinion on the stock or unsophisticated heuristics. This study found that stock recommendations were positively associated with price to earnings and projection of long-term growth valuation methods. However, this study found little evidence that stock recommendations were associated with residual income models, proposing that stock recommendation based on naive models did not account for the present value valuation models. The study criticised analysts' reliance on simple valuation models such as price to earnings and long-term growth forecasts, since relying on residual income models is associated with the annual return. This study found that investors would earn a profit if they relied on the present value models rather than on the stock recommendations provided by analysts.

Loh and Mian (2006) focused solely on analysts' ability to incorporate recommendations and investment value into their forecasting, finding that analysts who produced more accurate earnings forecasts also produced more profitable stock recommendations which indicated that the analysts used their earnings forecast to make stock recommendations. Furthermore, they found that both types of recommendation (favourable and unfavourable) had investment value for investors. Ertimur et al. (2007) built on the Loh and Mian (2006) model by relating the earnings forecast accuracy to profitable recommendations after controlling for analyst expertise and confirmed the previous result. They then studied the effect of the recent rules governing analysts, such as the Research Analyst Global Settlement and the passing of the Regulation Analyst Certificate (AC). They found that the relationship between accuracy and profitability was stronger in the period after regulation than in the period before it.

Barniv et al. (2009) replicated Bradshaw (2004) study before and after Regulation FD to measure the effect on the relationship between the stock recommendations, valuation models and future earnings. This study found that the relationship between residual income and stock recommendation was negative but weaker, long-term growth continued to have a positive but weaker relation with recommendations after Regulation FD. However, the price-to-earnings to stock recommendation ratio increased after Regulation FD. Finally, they found that the association between residual income and future returns increased after regulation, while stock recommendations had a negative relationship with future stock returns. Chen and Chen (2009) further confirmed Barniv et al. (2009) results, emphasising the effect of NASD Rule 2711 over that of Regulation FD. They argued that this rule improved analysts' independence as the association between stock recommendation and residual income valuation models (Bradshaw, 2004) was stronger after implementing the rule.

Contrary to Bradshaw (2004) and Barniv et al. (2009), Jung et al. (2012), using a sample from the period between 1994-2006, found that the market stock response to stock recommendations with long-term growth forecast was stronger, especially after Regulation FD. The study concluded that the inclusion of stock recommendations with their forecasts would improve future career prospects in the post-reform period. Simon and Curtis (2011) confirmed the previous results and found that the most accurate analysts' recommendations correlated with long-term rigorous valuation models, but were less correlated with heuristic short-term models when compared with less accurate peers' recommendations. The study also found that even if analysts used a rigorous valuation model but did not forecast accurately, they would at least be likely to make profitable recommendations. Regarding the characteristics of analysts, it was found in

this study, that All-star analysts were more likely to use rigorous valuation models, indicating that reputation incentives will motivate them to use growth-based valuation models.

Significant attention in academic literature was given to earnings forecasts and stock recommendations. Yet, the analysts' report also includes target prices. The following subsection will shed light on the target prices as an important part of these reports.

2.4.3 Target Prices

The target price forms a major output in analysts' reports. Target price represents the analysts' judgement of the expected value of the stock (Lin et al., 2016). Hence, the analyst is supposed to use the forecasted target price in their recommendation. Analysts compare the target price with the current trading price to determine whether the stock is undervalued or overvalued or fairly priced. Based on that, the analysts will issue Buy (Sell) recommendations if the target price is higher (lower) than the current trading price.

2.4.3.1 Early Evidence on Target Prices

While early research on sell-side literature focused on the stock recommendations and earnings forecasts, Bradshaw (2002) was the first to empirically investigate target prices using 103 analysts' reports from 1998 and 1999. This study found that two thirds of these reports included forecasted target prices, which were mostly calculated using simple valuation models such as price to earnings and long-term growth models. This study also proposed that analysts issued target prices to justify favourable recommendations or intentionally excluded it if they did not support the recommendations and used qualitative information to justify the less favourable

recommendations. Although Bradshaw (2002) was the first to give evidence concerning target prices, the small number of reports studied made generalisation difficult.

2.4.3.2 Information Content of Target Prices in Analyst Reports

Following Bradshaw (2002) findings, the usefulness of the target price was put into question. Brav and Lehavy (2003) used a large sample of target prices, stock recommendations and earnings forecasts from different resources (e.g., COMPUSTAT, First Call and I/B/E/S) to test their usefulness and value relevance for the period from 1997 to 1999. This study documented incremental information value of the target prices revisions even in the presence of earnings forecasts and stock recommendations. The study specifically documented a significant abnormal return in the period surrounding the issuance of target prices. They also documented a positive association between abnormal returns, and the favourability of the target prices and confirmed the optimistic behaviour of analysts by assessing long-term measures of the relationship between the target and current market prices. They found that the forecasted target prices were, on average, 28% higher than the current market price.

In addition, Asquith et al. (2005) confirmed that target prices had unique information content. Through analysing the 1126 full analysts' reports from the period used by Brav and Lehavy (2003), of which 72.6% contained target prices forecasts, the results of this study showed that the market reaction to the changes in the target prices were larger for the same percentage changes in earnings forecast which indicated that target prices had unique information content. Secondly, they found that only 54% of analysts' price targets were achieved or exceeded in any time during the 12 months following the report's release date. Thirdly, they showed that the accuracy of target prices was negatively

correlated with an analyst's optimistic behaviour. Finally, the market reaction of lowering target prices was statistically significant, and increased for small firms or small analysts' coverage.

Huang et al. (2009) confirmed the usefulness of target prices by studying the investment strategies of three portfolios; one based on the revisions of the consensus stock recommendation, another on the revision of the consensus target prices, and the third on the changes of both. They found that an investment strategy based on the changes of the revisions of both stock recommendation and target prices would lead to higher adjusted risk returns than the other two strategies.

Recently, Lin et al. (2016) studied the usefulness of target prices to institutional investors. This study found that institutional investors traded based on information contained in target prices after controlling for earnings forecasts, stock recommendations and other institutional trading determinants documented in the prior literature. These conclusions are based on a sample spanning 1999 to 2011. Institutional trading is more pronounced when the stock recommendations and target prices give consistent information and are guided by short-term institutional investors. Moreover, institutional investors trade more based on analysts' target prices in small size firms and firms with low analyst coverage consistent with the increase in the marginal importance of analysts' opinion in low information asymmetry firms. In addition, Hashim (2015) confirmed Lin et al. (2016) conclusion and proposed that All-star ranking affects institutional investors' reliance on target prices.

Contradicting the view that institutional investors discipline analysts' behaviour, Bilinski et al. (2018) argued that the presence of short-term institutional investors will

negatively impact the behaviour of analysts by making them more likely to strategically issue optimistic target prices in order to transfer their over-priced shares to naïve individual investors. This paper argued that analysts attempt to please short-term institutional investors by issuing optimistic target prices but not optimistic earnings forecasts because the latter heavily determine the analysts' reputation. It also found that investors failed to detect the analysts' biased behaviour and, finally, it proposed that short-term investors compensated analysts who engaged in this biased behaviour through trading commissions.

2.4.3.3 Analyst's Ability to Forecast Target Prices

After documenting evidence of the market response of the target prices and its usefulness, Bradshaw et al. (2013) extended target price research by questioning the ability of analysts to predict target prices in the period between 2000 and 2009. This study found that analysts could not forecast target prices accurately. Specifically, they showed that analysts forecast target prices were overestimated by 15%, with an absolute forecast error of 45%. The target price was only met 38% of the time at the end the 12-month forecast horizon, while the actual prices were higher than target prices 64% of the time during the period. They justified the latter results by arguing that, despite the significant market reaction to target prices, the reputation of the analysts was not affected by the accuracy of it. This study also proposed that sophisticated investors do not rely on target prices. Conversely, Hashim (2015) proposed that Bradshaw et al. (2013) argument regarding the lack of evidence that target prices affect analysts' reputation does not necessarily mean that analysts are not assessed based on the target prices. Thus, Hashim (2015) examined and confirmed the effect of All-star analysts'

ranking on the institutional investors trading decision based on target prices. This study also found that low-quality target prices affected the institutional investors' decision to vote for the analysts.

2.4.3.4 Analyst's Valuation Models to Forecast Target Prices

The analysis and decision-making process of analysts were, for many years, inside a black box (Schipper, 1991, Bradshaw, 2011). In an attempt to understand these processes and determine the valuation models used to forecast target prices, Hashim and Strong (2018) used target prices, cash flow forecasts and earnings forecasts between 2000 and 2010 to study the association between analysts' outputs. The study found that when analysts disclosed cash flow forecasts, their target prices were more accurate. Moreover, this study evidenced that the more accurate cash flow forecasts lead to higher quality target prices. The latter association is stronger for firms that are challenging to value. Therefore, Hashim and Strong (2018) suggested that the analyst's decision to issue cash flow forecasts was related to the analysts' intention to use cash flow, rather than earnings forecasts, to forecast target prices. In addition, Gleason et al. (2013) studied 750,000 target prices for the period between 1997 and 2003. They found that analysts produced better target prices when they used more sophisticated valuation models - such as the residual income valuation model - than when using simple valuation models such as price to earnings. It has been suggested that the low levels of accuracy can be attributed to the oversimplified, heuristic models used to produce them. Furthermore, they documented that analysts who issued accurate earnings (key input to forecast target prices) had more accurate target prices. Finally, they mentioned that studying the attainability of target prices in a 12-month period was an inadequate performance

measure for investors, as investors were more concerned with stock returns and, therefore, would find that better target prices had better investment return.

In 1993, the analysts' research reports started to contain cash flow forecasts. Analysts' reports which include earnings and cash flow forecasts on I/B/E/S increased from 1% in 1993 (DeFond and Hung, 2003) to 56.4% in 2008 (Call et al., 2013). The proposed main reason behind the issuance of cash flow forecasts, its usefulness and the debate regarding its quality, is presented and discussed in the following section.

2.4.4 Operating Cash Flow Forecast

Academic interest in this area was motivated by an exploratory study made by DeFond and Hung (2003). In this pioneering study, it was found that analysts' earnings forecasts accompanied by cash flow forecasts increased from 1% in 1993 to 15% in 1999. In this study, it was suggested that the main reason to issue cash flow forecasts was investors' demand, proposing that firms' specific factors make cash flow forecasts more useful in their evaluation. The proposed factors were: the magnitude of the accruals component of the earnings; different accounting choices compared with their industry peers; high earnings volatility; and poor financial health (characterised by Altman's Z score). Subsequent to this study, two main lines of argument emerged in the literature; one consistent with DeFond and Hung (2003) in confirming the usefulness of analysts' cash flow forecasts (e.g., Call, 2007, Call, 2008, Call et al., 2009, McInnis and Collins, 2011, Pae and Yoon, 2011, Yoo and Pae, 2013, Call et al., 2013, Mohanram, 2014, Radhakrishnan and Wu, 2014) and the others arguing that there was no additional value to this forecast (Givoly et al., 2009, Bilinski, 2014).

2.4.4.1 Usefulness of Cash Flow Forecasts

There has been increased attention in the field of analysts' cash flow forecasts. Many empirical tests were conducted to examine the usefulness of cash flow forecasts to different market participants. For example, Call (2007) proposed that the presence of cash flow forecasts helps investors to signal the importance of cash flow information. By using cash flow forecasts from 1993 to 2005, he showed that investors relied more on the cash component of earnings for firms with cash flow forecasts available. Furthermore, he found that the existence of cash flow forecasts motivated investors to pay attention to cash flow information. Finally, he found that managers were more likely to report abnormally high operating cash flows if the firm had a cash flow forecast, suggesting that the managers tried to meet or beat cash flow forecasts.

In another paper, Call (2008) proposed that analysts have a monitoring role in issuing cash flow forecasts. The study argued that the issuance of cash flow forecast will encourage managers to give more accurate and informative cash flow data, which makes the prediction of future cash flows easier. He concluded that the reported cash flow information was more predictive of future cash flow in the existence of cash flow forecasts.

Moreover, Pandit et al. (2012) confirmed the impact of cash flow accuracy on analysts' career outcomes, but found that the marginal impact of cash flow accuracy was less significant than the marginal impact of earnings forecast accuracy on the turnover. They also found that this impact increased with the existence of the firm-specific factors described by DeFond and Hung (2003), except for the firm's financial health. Furthermore, Brown et al. (2013) gave evidence that cash flow forecast had positive

implications on the issued earnings forecast, as they found that when managers beat both earnings and cash flow forecasts, it implied a higher earning quality and hence a larger favourable market reaction to the earnings surprise was accompanied by a cash flow surprise. This is considered to be a rational process, since these firms later documented improved market performance.

In addition, Jung (2015) found that cash analysts' coverage depended on a firm's specific characteristics, and that cash analysts' coverage was higher for firms with a high cost of equity. He also proposed that analysts play informational and monitoring roles when issuing cash flow forecasts, shown by the negative relationship between cash flow coverage and cost of equity capital after controlling for both variable determinants. Furthermore, Mao and Yu (2015) showed another economic impact of issuing cash flow forecasts when they documented that cash flow forecasts' issuance significantly decreased audit fees and report lags. They also found that after initiation of cash flow forecasts, firms had lower disclosures in section (404) b internal control weaknesses and thus argued that issuance of both earnings forecasts and cash flow forecasts would affect managers' accounting behaviour and increase the quality of earnings, which is considered as an external monitoring rule. This reduction in both inherent and controlled risks, therefore, leads to reduced effort and cost in auditing procedures.

Hashim and Strong (2018) showed that analysts benefited from disclosing cash flow forecasts as it helps them to issue more accurate target prices. This study used target prices, cash flow forecasts and earnings forecasts between 2000 and 2010 to study the association between analysts' outputs Hashim and Strong (2018) found that when analysts disclosed cash flow forecasts, their target prices were more accurate. Moreover,

this study evidenced that more accurate cash flow forecasts lead to higher quality target prices. Lastly, this study showed that the impact of the presence of cash flow forecasts on target price accuracy is higher for firms that are more challenging to value. Therefore, Hashim and Strong (2018) suggested that the analyst's decision to issue cash flow forecasts was related to the analysts' intention to use cash flow, rather than earnings forecasts, to forecast target prices.

Overall, prior studies have suggested that cash flow forecasts had a positive impact on the several dimensions of the information environment. Yet, a debate over the quality and sophistication of cash flow forecasts has arisen which will be discussed in the following section.

2.4.4.2 Debate over quality of cash flow forecasts

Consistent with preceding work, Call et al. (2009) proposed another important reason to forecast cash flows when mentioning that the approach that analysts used when issuing cash flow forecasts was more structured, since it included forecasting a full set of financial statements, which would force analysts to pay more attention to specific earnings components. Therefore, the analysts' earnings forecasts reflected a better understanding of the implications of current earnings for future earnings when they were accompanied by cash flow forecasts. Hence, they found that more accurate cash flow forecasts decreased the likelihood of analysts being fired; suggesting that cash flow forecasts accuracy was relevant to analysts' career outcomes.

Contrary to previous studies, Givoly et al. (2009) called cash flow research into question and argued that cash flow forecasts were less accurate than earnings forecasts

and only weakly associated with stock returns. They concluded that analysts made naïve extensions to their earnings forecasts by adding depreciation and amortisation while ignoring other adjustments to the working capital components. In addition, they emphasised that the difference between the earnings forecasts and cash flow forecasts did not represent the accrual forecast and that, therefore, the implied accrual given by this forecast had low prediction power and low information content. Moreover, they argued that rational analysts would invest their time forecasting earnings accurately due to the media focus on it rather than forecasting cash flow. Finally, they argued that cash flow forecasts were prepared using earnings figures, so assuming that earnings forecasts were inappropriate is implicitly assuming that the operating cash flow figures were also inappropriate.

In rebuttal, Call et al. (2013) gave robust evidence on the sophistication of cash flow forecasts. First, this study compared cash flow forecasts with naïve forecasts (i.e., earnings forecasts adjusted to depreciation and amortisation) and found that cash flow forecasts were more accurate than simply naïve extension to the earnings' forecasts. Second, they analysed 90 full-text analyst reports which contained cash flow forecasts and found that 80% made sophisticated adjustments for accruals rather than simply adding depreciation to the earnings forecasts. Third, by using a sample of cash flow forecasts from between 1993 and 2008, they documented an abnormal return surrounding the cash flow forecast revisions, even after controlling for analysts' earnings forecast revisions. Hence, this study proposed that cash flow forecasts were useful to equity investors and other market participants and that the findings of Givoly et al. (2009) were misleading. Call et al. (2013) argued that the large forecast errors found by Givoly et al. (2009) arose because of the differences in data measurement used in tests

which led to non-diagnostic assessment. Givoly et al. (2009) compared data from I/B/E/S for cash flow forecasts and actual cash flow from operations data from COMPUSTAT. Call et al. (2013), however, mentioned that examining the accuracy of cash flow forecasts using actual and forecasted data from I/B/E/S will lead to diagnostic test due to the consistency in definitions in the I/B/E/S between actual and forecasted figures. The debate over the quality of cash flow forecasts has motivated other scholars to study the factors which determined their accuracy.

2.4.4.3 Accuracy of Cash Flow Forecasts

Similar to studies which examined the importance of the accuracy of earnings forecasts and the factors determining this accuracy, two recent studies applied the same methodologies to test for the accuracy of cash flow forecasts. Pae and Yoon (2011), based on 25,739 observations in the period between 1994-2007, suggested that cash flow forecast required different skills than those needed to forecast earnings. They specifically found that past earnings forecasts did not affect the accuracy of cash flow forecasts and that instead, the accuracy of cash flow forecasting depended first on the analyst's characteristics – such as experience and following a smaller number of firms. Second, it depended on the accuracy of previous cash flow forecasts. They further argued against, and summarily dismissed Givoly et al. (2009) argument that these were simply naïve extensions of earnings forecasts plus depreciation and amortisations.

Yoo and Pae (2013) have also studied the accuracy of cash flow forecasts, building on Clement (1999) analysts' characteristics model (the general experiences of analysts, company-specific experience, number of companies followed, company complexity, industry complexity and size of the brokerage house) and Brown (2001) past accuracy

model. This study used 11,452 cash flow forecasts available on I/B/E/S for the period between 1995 and 2007. Their initial findings showed that these models were more accurate predictors than those currently used in industry. However, the analysts' characteristic models were useful when the cash flow forecast was issued for the first time. Finally, cash flow forecast ability was distinct from earnings forecast ability, as they found that cash flow forecast accuracy depended on cash flow accuracy specific-variables rather than earnings forecast accuracy. The prior evidence of the accuracy and usefulness of cash flow forecasts motivated academics to study its effect on the accrual anomaly.

2.4.4.4 Effect of Cash Flow Forecasts on Accrual Anomaly

Issuing cash flow forecasts motivated academics to examine its effect on accrual anomalies previously documented by Sloan (1996). Sloan (1996) argued that investors were unable to differentiate between the cash flow component and accrual component of earnings, whereupon McInnis and Collins (2011) suggested that forecasting cash flow and earnings together is implicitly forecasting the total operating accrual and, therefore, decreases the management's ability to manipulate earnings through accruals. Therefore, they hypothesised and found that the accrual quality improved and that the tendency to meet or beat the earnings benchmark declined after issuing cash flow forecasts, also showing that there were general managerial trends towards alternatives such as earnings guidance.

Moreover, Radhakrishnan and Wu (2014) proposed that providing cash flow forecasts would increase investors' attention concerning the accrual component. They found that the accrual mispricing for firms with both earnings forecasts and cash flow

forecasts was less than the accrual mispricing for firms with earnings forecast only in the period between 1993 and 2002. This increased awareness resulted in a considerable decline in mispricing in the period spanning between 2003 and 2009. Further, Mohanram (2014) mentioned that accrual anomaly had decreased significantly since 2002, arguing that issuing cash flow forecasts might be one of the important reasons for this, since investors who had cash flow forecasts accompanied with earnings forecasts could interpret the accrual component easily. Therefore, this study hypothesised that the probability of mispricing accruals was less when cash flow forecasts were initiated for the first time, but continued to be mispriced when cash flow forecasts were no longer available. The study also concluded that this effect was more pronounced with more accurate forecasts. However, Ecker and Schipper (2014) criticised the two previous papers by arguing that neither Mohanram (2014) nor Radhakrishnan and Wu (2014) studied the information content of cash flow forecasts or mentioned how investors used this information and that both studies simply assumed that the presence of cash flow forecasts would reduce the anomaly. This study specifically called future studies to study how the cash flow forecasts improved the investors' understanding of the accrual anomaly. It also argued that the results of both studies were guided mainly by the statistical method (pooled estimation) choice, the simultaneous decrease in the cash flow forecasts and the decrease in the accrual anomaly.

Lastly and in contrast with DeFond and Hung (2003), Bilinski (2014) argued that cash flow forecast depended on the accuracy of accruals. Therefore, it was unlikely to supplement earnings forecast with cash flow forecasts when the earning quality was low. Bilinski (2014) used 537,766 individual analysts' earnings per share forecasts from the period between 2000 and 2008, of which only 9.3% were supplemented by cash flow

forecasts. The study evidenced that analysts did not disclose cash flow forecasts when the quality of earnings was low, and justified this result by arguing that cash flow accuracy depends on the accuracy of accruals and, thus, low-quality earnings implies low-quality cash flow forecasting, suggesting that, because cash flow forecasts have low investor value, they are less likely to be made. Beside cash flow forecasts, analysts have recently supplemented their earnings forecasts with several forecasts.

2.4.5 Analysts' Supplementary Forecasts

Beside the main elements of the analysts' reports, supplementary forecasts included in analysts' reports increased significantly in the last two decades. Yet, the literature rarely discussed the analysts' incentive to issue these forecasts and the usefulness of these forecasts to market participants. In this section, I will shed light on sales forecasts and dividend forecasts as frequent supplementary forecasts by analysts.

2.4.5.1 Analysts' Revenue Forecasts Literature

Analysts' revenue forecasts supplemented with earnings forecasts increased from 7.4% in 2000 to 74.3% in 2013 (Bilinski and Michael, 2018) which motivated the research in this area to investigate the characteristics and main reasons of the issuance of these forecasts.

Research on the usefulness and characteristics of revenue forecasts is relatively sparse. Ertimur et al. (2003) examined the market reaction to the surprise of revenue accompanied with a surprise of earnings using a large sample spanning from 1994 to 2000. This study argued that market participants will reward the earnings surprise accompanied with positive revenue surprise as it implies more persistence and less noise

compared with expenses surprise. This paper also found significant market reaction to the surprise in revenue after controlling the earnings surprise. Jegadeesh and Livnat (2006) confirmed that the market reacts significantly to revenue surprise proposing that revenue surprise has incremental information even in the presence of earnings information. Moreover, Keung (2010) found that the price reacts higher for earnings forecasts supplemented with revenue forecasts. Hence, he concluded that revenue forecasts enhanced the credibility of earnings forecasts. This paper also argued that analysts supplement revenue forecasts with earnings' forecasts only when they have superior information.

By focusing on analysts' incentives, Ertimur et al. (2011) proposed that analysts choose to provide disaggregated earnings' components like revenue forecast to I/B/E/S to signal their superior abilities to interpret and understand the earnings' generating process. This paper found that less reputable analysts with superior forecasting skills were more likely to supply these forecasts in I/B/E/S in order to signal their skills and, therefore, have positive career outcomes. This paper also documented higher stock reactions to earnings forecasts supplemented with revenue forecasts compared with stand-alone earnings forecasts.

Lastly, Bilinski and Michael (2018) evidenced that the increase of analysts' supply of these forecasts based on investors' demand of these forecasts when the quality of expenses component of earnings is low. This proposition is based on the assumption that low quality expenses will not affect the revenue forecasts accuracy as much as it affects the expense component. This study also found that the accuracy of analysts' revenue forecasts is not associated with the quality of the expenses. Therefore, analysts'

propensity to issue revenue forecasts is not associated with the quality of expenses component but highly associated with the quality of the revenue component of earnings.

2.4.5.2 Analysts' Dividend Forecasts

Despite the significant role of the dividends' signals play in the market, the literature in the analysts' dividend forecasts is scarce. Brown et al. (2002) studied the Australian sell-side analysts' dividend forecasts from 1985-1998. This study compared between the accuracy of consensus dividend forecasts and consensus earnings forecasts. It was found that dividend forecasts are more accurate and less biased than earnings forecasts. This result was justified by proposing that forecasting dividends is easier than forecasting earnings because of the "sticky" nature of dividends. It was also found that the dividends' forecast accuracy is affected by the size of the firm, the forecasting horizon; the number of the analysts' who follow the firm and the uncertainty between the analysts.

Brown et al. (2008) extended the prior study and examined analysts' dividend forecasts internationally. This study examined the analysts' dividend forecasts in 39 countries in the period between 1995 and 2004 using I/B/E/S, specifically focusing on the association between analysts' dividends forecasts, earnings forecasts and dividend policies globally. Firstly, it found that the accuracy of the analysts' dividend forecasts is higher than the accuracy of earnings forecasts in most countries' samples due to the 'sticky' nature of the dividends. It also found that analysts' earnings forecasts are weakly associated with dividend forecasts accuracy in the common-law countries. The latter result was justified by arguing that firms in common law countries adapt specific pay out strategies due to the signalling role of dividends. This association is weaker in common-

law countries which have a more developed capital market. They justified the latter results by arguing that dividends play a key signalling role in such countries.

Finally, Bilinski and Bradshaw (2015) explored the characteristics, and the information content of individual dividend forecasts using international samples from 2000 to 2013. The study found that analysts issued more accurate, and informative dividend forecasts compared with mechanical time series forecasts. Further, more skilled analysts issued more accurate dividend forecasts. In addition, this study found that the market reacted to dividend forecasts revisions even after controlling for the effect of stock recommendation, earnings forecasts and target prices. It also found that markets reacted negatively to firms that did not meet the analysts' forecasts. This study also proposed that investors can benefit from these dividends when making investment decisions and the increase of analysts' supply of these forecasts based on investors' demand of these forecasts.

It can be concluded from the prior literature that analysts' informational roles in the financial market have attracted the attention of accounting researchers for more than three decades. Analysts have played a key role in disseminating the financial information to interested users. Among these users are institutional investors who represent the buy-side clients of analysts' research (Ertimur et al., 2011). They are responsible for the All-star ranking of the analysts which has significant positive career outcomes (Groysberg et al., 2011). Thus, institutional investors are the key customers of the financial analysts' products (Ljungqvist et al., 2007) and they trade based on this as more informed users (Malmendier and Shanthikumar, 2007).

Section 2.5 of this literature review chapter reviews the key papers which discuss institutional investors' trading behaviour. Section 2.5.1 reviews key papers which discuss institutional investors as sophisticated users of financial information in the capital market. Section 2.5.2 summarises the institutional investors' behavioural biases. Meanwhile Sections 2.5.3 and 2.5.4 shed light on the institutional investors' preferences and the roles they play in mitigating well-known anomalies in the financial market. Subsequently, Section 2.5.5 reviews the main papers that have examined the interaction between institutional investors and analysts. Lastly, Section 2.5.6 summarises and concludes.

2.5 Institutional Investors

Institutional ownership in the U.S capital market has increased dramatically in the last thirty years (Amin et al., 2015). The high presence of institutional investors has motivated academics to examine several aspects of their trading behaviour and its impact on the overall information environment. Beside the high presence of institutional investors, they are perceived as informed users of financial information in the financial markets. This is justified by the higher ability to trade in large blocks of stocks, higher level of experience, and greater access to information resources (e.g., El-Gazzar, 1998). Their level of informativeness, sophistication and behavioural biases have attracted the attention of academics in the past two decades.

2.5.1 Institutional Investors' Sophistication

Institutional investors are commonly viewed as sophisticated users who have the ability and willingness to engage in information search activity (Ali et al., 2004). They differ

from individual investors in various ways; particularly in that they trade in large blocks, and have experienced staff with access to various resources (Cohen et al., 2002). Yet, they face constraints due to the legal duties they face as trustees, and career concerns (Brown et al., 2014). Thus, literature related to the sophistication of institutional investors and their ability to improve the overall information environment has found mixed results.

On one hand, institutional investors are informed users who trade based on superior information. For instance, Hand (1990) proposed that institutional investors, as more sophisticated users of accounting information, are able to discern the true cash flow implications of accounting information. Moreover, El-Gazzar (1998) found that reactions to earnings announcements were smaller for firms with larger blocks of institutional holdings. The study argued that the cost of obtaining and processing information from different resources explains the large blocks of stocks held by institutional investors in the companies. Therefore, the benefits of searching and processing information per stock decrease with an increase in the number of stocks held. This study also argued that the existence of institutional investors would increase voluntary management disclosures, which might decrease the informative value of earnings announcements. Moreover, Amihud and Li (2006) argued that a high presence of institutional investors reduces the role of costly dividends. This study contended that informed users such as institutional investors do not need a costly signal such as dividends. Thus, the information content of the dividends decreased with an increase in institutional holdings. The study found that the abnormal return surrounding the dividend announcements was lower in firms with a high percentage of institutional

investors. Thus, the disappearance of dividends is partly explained by the increase in institutional investor holdings.

In addition, Barber and Odean (2008) argued that, in contrast with rational institutional investors, individual investors are the net buyers of the popular stocks in the news, with high returns and unusual trading volumes. This can be explained by the difficultly faced by institutional investors choosing among thousands of stocks to invest in. Further, Boehmer and Kelley (2009) found evidence that institutional investors' trading drives the stock prices to fundamental values. Thus, the presence of institutional investors increased stock price efficiency. Moreover, Berkman and McKenzie (2012) found institutional investors were active in the period after the announcement and were able to forecast the announcement. Thus, this study inferred that institutional investors are sophisticated, informed traders who have the required skills to pick profitable stocks. Lastly, Hendershott et al. (2015) found that institutional investors' are able to discover news early and trade based on announcements, crises news and earnings surprise news. This study found consistent evidence using different aspects of news that institutional investors are informed of the news up to five days prior to its release.

On the other hand, several studies failed to document the superior abilities of institutional investors. For instance, Gompers and Metrick (2001) argued that the association between subsequent stock returns and institutional investors is not explained by institutional investors' superior abilities or an informational advantage. Instead, it is explained by the large demand shocks institutional investors create. In addition, Cai and Zheng (2004) found that institutional investors are positive-feedback traders and failed to find evidence that their trading forecasted the subsequent returns. This study also

found that lagged institutional investors' ownership is negatively associated with stock returns, consistent with the subsequent reversal impact of institutional investors' positive feedback trading. Moreover, Lewellen (2011) concluded that institutions have little stock-picking ability and failed to benefit from well-known anomalies. Lastly, Edelen et al. (2016) concluded that institutional investors play a casual role in the financial market and invest in the wrong side of the anomaly.

While some studies argue institutional investors are sophisticated, informed and trade as rational users of financial information, a second strand of the literature failed to find evidence of the sophistication of institutional investors after analysing their actions in the financial market. This might be explained by the behavioural biases institutional investors' money managers displayed due to career and reputational concerns.

2.5.2 Institutional Investors Behavioural Biases

Despite the belief that institutional investors behave as rational users, several studies have shown they are prone to behavioural biases. For instance, Puetz and Ruenzi (2011) demonstrated that equity mutual funds managers are overconfident as they increase their trading activities following a previous good performance. In addition, DeVault et al. (2018) contradicted the "smart-money" hypothesis and found evidence that institutional investors, rather than individual investors, are sentiment traders who are responsible for destabilising the market through sentiment-induced demand shocks. This section will examine two main biases for institutional investors' behaviour; momentum trading and herding behaviour.

2.5.2.1 Momentum Trading

Momentum trading, trend chasing and positive feedback are interchangeable terms used to describe the buying of stocks when their prices increase and selling stocks when their prices decrease (Griffin et al., 2003). In contrast to the view that noise traders are responsible for destabilising stock prices by trading based on positive feedback, DeLong et al. (1990) explained how rationale traders might engage in this behaviour. In particular, this study argued that rationale traders buy stocks with positive feedback at an earlier stage and then try to sell to noise traders later at a higher price.

To examine DeLong et al. (1990) assumption, a number of empirical studies examined institutional investors' momentum trading and found conflicting results. For instance, Lakonishok et al. (1992) examined the trading behaviour of tax exempt pension fund managers from 1985 to 1989 and found weak evidence that pension fund managers follow positive feedback when trading in small capital securities. Moreover, Grinblatt et al. (1995) analysed 155 U.S. mutual funds from 1975 to 1984 to determine the momentum trading and herding behaviour of fund managers. By applying the same methodology used by Lakonishok et al. (1992), the study found strong evidence of momentum trading. Yet, Wermers (1999) concluded that mutual funds managers engaged in momentum trading only when buying and selling small stocks.

Gompers and Metrick (2001), however, argued that the positive correlation between the returns in the prior year and institutional holding is driven by firm size. The positive association between size and institutional ownership, and size and momentum is responsible for the positive correlation between institutional ownership and momentum. Yet, the regression results showed a negative association between institutional ownership

and momentum after controlling for the size of the firm. Thus, the study concluded that institutional investors are not momentum traders. Griffin et al. (2003), however, found evidence using daily trading data that institutional investors are momentum traders.

Therefore, Altı et al. (2012) proposed an explanation of the contradictory results by arguing that the momentum behaviour of institutional investors depends on the quality of the information the mutual funds managers have. In particular, managers would wait for positive news to confirm their own expectations when they are uncertain whether to initiate a purchase of stock and enhance confidence in the managers' private information. However, if the mutual fund manager has low quality private information, the likelihood that they would rely on public news gives the impression of "chase the trend" behaviour.

Overall, the conflicting results of previous studies can be partly explained by the different measures of institutional investing, different sample periods and different methodologies (Sias, 2007). Positive feedback behaviour was closely studied with the herding behaviour of institutional investors as feedback trading behaviour is one form of herding behaviour.

2.5.2.2 Institutional Investors Herding

The tendency of institutional investors to herd (trade together) was studied broadly in the literature. Investors' herding was defined as a "group of institutional investors following each other into (or out of) the same securities over some period of time" (Sias, 2004, p.166). A number of reasons were proposed in the literature to explain this behaviour. Choi and Sias (2009) summarised them in six main points. First, investigative

herding occurs when institutional investors follow the correlated (private) signals. Second, an informational cascade occurs when institutional investors intentionally abandon their noisy private information to follow the acts of other investors. Third, reputational herding occurs when institutional investors are concerned with appearing bold for the sake of their careers and, thus, follow other managers. Fourth, positive feedback trading is when most of the institutional investors act as momentum traders; buying past winners and selling past losers. Fifth, characteristics herding occurs because of the homogeneous preferences of institutional investors in picking stocks. Lastly, fads occur as institutional investors tend to trade on the most popular stock.

A growing number of studies have examined the herding behaviour of institutional investors. One of the most influential papers on herding behaviour is Lakonishok et al. (1992). This study examined the herding behaviour of 769 tax-exempt pension fund managers between 1985 and 1989. It found only weak evidence that pension fund managers herd or follow positive feedback when trading in large capitalisation securities. There was stronger evidence related to trades in small securities, which made up less than 5% of institutional investors' portfolios. This study concluded that institutional investors use various investing styles.

Moreover, Grinblatt et al. (1995) analysed 155 U.S. mutual funds from 1975 to 1984 to examine the momentum trading and herding behaviour of fund managers. By applying the same methodology used by Lakonishok et al. (1992), the study found weak statistical evidence of herding by mutual fund managers and strong evidence of momentum trading. Further, by using the same methodology of Lakonishok et al. (1992), Wermers (1999) studied the herding behaviour of mutual fund managers in the period

between 1975 and 1994. The study found that, compared with pension funds, mutual funds managers showed a higher, but still weak tendency, to herd in the market. Moreover, mutual funds managers herd more when buying and selling small stocks with high past return (the past winners).

Yet, Sias (2004) found contradictory results and concluded that institutional investors herd significantly in the capital market. This study specifically found that different types of institutional investors follow their prior trading behaviour and other institutional investors in buying and selling stocks in two subsequent quarters. This study provided evidence that institutional investors' demands are highly correlated with the previous institutional investors' demand. Sias (2004) clearly acknowledges that the difference in results is based on applying different methodologies, not different samples. While Lakonishok et al. (1992) tested for the herding behaviour of the institutional investors within the same period (simultaneously) by applying the cross-sectional temporal model, Sias (2004) model tested the cross sectional correlation between institutional trades within the same and following quarter. Moreover, this paper found the intensity of herding behaviour varies for different types of institutional investors. It was stronger in securities with small capitalisation. In addition, this study argued that while there is consistent evidence that institutional investors are momentum traders who follow signals of previous returns, institutional investors do follow their own buying behaviour and other institutional investors' buying behaviour more than they chase the past returns. Lastly, this study found that institutional herding behaviour did not move the stock prices away from the fundamental value.

Further, Choi and Sias (2009) argued that institutional investors do herd at the industry level. They argued that institutional investors follow each other in and out of specific industries. In particular, the study found that after controlling for lag demand, the documented momentum trading is insignificant in explaining the institutional investors' trading behaviour. The findings suggested characteristics herding is the clearest reason behind institutional industry herding as the institutional investors' preferences towards size and book-to-market ratio explained the herding behaviour on an industry level. Reputational herding also played a role as the results revealed that institutional managers follow other managers from similar classification (mutual funds, banks, insurance companies, independent advisers and unclassified). The results also demonstrated a positive association between contemporaneous industry returns and institutional industry demand.

Finally, Brown et al. (2014) argued the reliance of institutional investors on sell-side analysts led to herding behaviour observed in following analysts' stock recommendation revisions. This study specifically found that mutual fund managers displayed a higher tendency to herd following downgrades in stock recommendation revisions compared to upgrades, due to career concerns. In particular, mutual fund managers with a low rating and shorter managerial tenure were more likely to herd between 1985 and 2008. Moreover, mutual fund managers' herding based on their career concerns had a negative impact on stock returns in the subsequent period. The latter result is consistent with the prediction that overacting caused by reputational herding contributes to destabilising stock prices and moving them away from fundamentals.

Overall, institutional investors are shown as momentum traders who prefer winning stocks. Institutional investors also exhibit a tendency to herd in the capital market. Yet, these behavioural biases might be explained by institutional investors' preferences toward stocks with certain characteristics. In the following section, I will shed light on the main studies which have examined the preferences of institutional investors in the capital market. I also review the main papers which have examined the impact of institutional investors on the capital market.

2.5.3 Institutional Investors' Preferences and Stock Returns

The massive increase in the percentage of shares owned by institutional investors in the past three decades has stimulated examination of their preferences. A well-documented paper in the literature is Gompers and Metrick (2001) who were the first to argue that institutional investors institutional investors' preferences will affect the overall capital market. This study documented that institutional investors owned more than 50% of the stocks in the U.S. equity capital market in 1994. This pioneering study examined the preferences of institutional investors and their ability to predict future stock returns between 1980 and 1996. This study classified their preferences into three groups of factors. The first group, proxy for prudence, included dividends, S&P membership, firm age and volatility. The second group consisted of factors related to the liquidity of stocks, such as firms' size and turnover ratio, while the last group consisted of variables that were previously acknowledged to have an impact on stock returns including the size of the firm, the stock's prior return and book-to-market ratio. The results indicated that institutional investors are momentum traders who prefer large and liquid stocks. Moreover, it was found that institutional investors' ownership forecasted the subsequent

quarterly and yearly return of the stocks due to the large demand the institutional investors create.

Yet, Bennett et al. (2003) argued that the preferences of institutional investors may shift over time. The results of the study indicated that while institutional investors still prefer large stocks, they started to hold smaller and riskier stocks. This had an impact on the overall capital market by increasing the liquidity of smaller stocks. The latter result was justified by the informational advantage of the institutional investors, as they have superior ability to forecast small stocks' return compared with their ability to forecast returns of large stocks. Thus, investment in smaller stock will be more profitable for them. This study also verified Gompers and Metrick (2001) findings that institutional investors' demand for large stocks increase its share prices. This means institutional investors should have been aware of the mispricing of large stocks. Thus, their investment should be directed to the smaller stock.

Yan and Zhang (2009) built on Gompers and Metrick (2001) study to further understand the main reason behind the positive association between institutional investing and subsequent stock returns. This study classified institutional investors as either short-term or long-term investors based on their investment horizons from 1980 to 2003. The results indicated that short-term institutional investors are mostly responsible for the positive association between institutional investors and the subsequent stock returns documented earlier by Gompers and Metrick (2001). This study also argued that short-term institutional investors have a superior informational advantage compared with long-term institutional investors. This paper argued that short

term institutional investors take advantage of the information available in the market. Thus, they are the sophisticated users of information in the market.

Overall, previous studies show how the presence of institutional investors affects stock prices. Moreover, their presence has an impact on the overall information environment, including the well-known anomalies. Institutional investors are supposed to respond to the anomalies as more informed users and play a role in mitigating their effects.

2.5.4 Role of Institutional Investors in Mitigating Anomalies

Institutional investors have access to several information resources, experienced staff and ability to trade on large blocks. Thus, it is crucial to examine their role in controlling the well-documented anomalies. This is particularly so, as the significant increase in the percentage of shares they hold over the last thirty years has made them the predominant players in the U.S. capital market (Amin et al., 2015). In this section, I will discuss the links between institutional investors and two well-documented anomalies: post-earnings announcement drift and accruals.

2.5.4.1 Post-Earnings Announcement Drift Anomaly

One well-documented anomaly is the post-earnings announcement drift which is defined as:

> *"The tendency for stocks to earn positive average abnormal returns in the three quarters subsequent to extreme positive earnings surprises and, more strongly, to earn negative average abnormal returns in the three quarters subsequent to extreme negative earnings surprises"*
>
> (Hirshleifer et al., 2008, p.1522)

Many reasons have been proposed to explain the post-earnings announcement drift, among them that stock prices did not fully recognise the impact of current earnings on subsequent earnings due to investors' failure to predict subsequent return from available information (Bernard and Thomas, 1989, 1990). Based on the latter argument and in line with the hypothesis that stock prices are influenced by the expectations of different types of investors, Bartov et al. (2000) proposed that institutional investors' ownership (as a proxy for sophisticated users) is negatively associated with the drift. In particular, this study examined the post-announcement drift anomaly around the quarterly earnings announcements between 1989 and 1993. Consistent with the conjecture, this study found that post-announcement drift was negatively associated with the percentage of shares held by institutional investors, even after controlling for firm size and transaction costs. It is therefore argued that the presence of institutional investors improves the efficient pricing of information. It also proposed that individual investors (as less sophisticated users of information) are responsible for post-announcement drift.

Further, Ke and Ramalingegowda (2005) applied a different approach by directly examining the institutional investors' trading response to post-earnings announcement drift using quarterly earnings announcement data in the period between 1986 to 1999. This study categorised the institutional investors into three main groups based on Bushee (2001) classification. These include transient short-term institutional investors who tend to react actively to financial information in the market, dedicated institutional investors who own large numbers of stocks in specific firms for long periods, and quasi-indexers who are passive investors and tend to hold diversified portfolios. Ke and Ramalingegowda (2005) found that the trading of transient institutional investors (not dedicated and quasi-index) exploited the post-earnings announcement drift. This trading

behaviour around the earnings announcement generated a positive abnormal return after deducting transaction costs. Further, this trading behaviour of transient institutional investors' speeds up the efficiency of stock prices by impounding the earnings data.

Moreover, Battalio and Mendenhall (2005) confirmed that large institutional traders exploited the post-earnings announcement drift. This study proposed that large and small traders respond to different sets of information. Consistent with the conjecture, this study found the buy and sell decisions of small traders tend to be based on the less sophisticated time series model. Yet, the large traders behaved as though they relied on analysts' forecasts. Therefore, large traders exploited the post-earnings announcement drift when the earnings announced exceeded the analysts' forecasts, while small traders' expectations were strongly associated with random walk forecasting of earnings. Further, Campbell et al. (2009) confirmed that institutional investors are sophisticated users who exploit the post-earnings announcement drift. This study used a unique methodology that linked institutional investors' ownership with daily trades to provide evidence that institutional investors are informed, highly frequent momentum traders who trade in advance in the direction of earnings surprises.

Recently, Chen et al. (2017) proposed that post-earnings announcement drift can be explained by the herding behaviour of institutional investors. This study found the drift is more pronounced in firms in institutional investors who herd in the same direction as the drift. When they trade together in the opposite direction, the effect of the drift will be reversed after two weeks. Lastly, this institutional herding did not move the stock prices away from the fundamentals.

In conclusion, most previous studies found that institutional investors and large traders behaved as informed users and were aware of the post-earnings announcement drift. Thus, they were able to profit from this anomaly and enhance the efficiency of stock prices in impounding the earnings information. The post-earnings announcement drift has been closely studied with another well-documented anomaly, the accrual anomaly. In contrast to post-earnings announcement drift, where investors underreact to earnings announcements, accrual anomaly states that investors are not able to understand the components of earnings; the accrual and cash component.

2.5.4.2 Accruals Anomaly

In a seminal study, Sloan (1996) found the cash flow component of earnings is more persistent than the accrual component and also documented that investors failed to differentiate between the two components. Thus, a positive (negative) abnormal return will be earned in firms with low (high) accruals. Sloan (1996) concluded that investors' naively focus their response on the earnings numbers. This has motivated scholars to examine whether sophisticated investors are able to identify the accrual anomaly and benefit from it. For instance, Collins et al. (2003) proposed that institutional investors were able to differentiate between accrual and cash components, due to superior analytical abilities and greater access to private information. Thus, this study examined the association between the annual institutional investors ownership and the pricing of accrual between 1988 and 1997. The findings show that firms with a high percentage of institutional ownership have the accruals priced more accurately.

Further, Lev and Nissim (2006), using quarter institutional ownership holding between 1982 and 2001, confirmed that institutional investors were aware of the accruals

anomaly. In particular, this study found that institutional investors traded based on accrual information but could not fully eliminate the mispricing of accruals. The latter result was explained by arguing that firms with a large number of accruals are those with a low book to market ratio and small-sized firms which do not attract institutional investors as they are considered risky investments.

Yet, Green et al. (2011) argued that accrual anomaly diminished significantly due to the trading activities of hedge fund managers, which implies that trading based on the accrual anomaly is no longer profitable. Finally, Battalio et al. (2012) examined the speed of sophisticated investors' in their response to accruals. They found large traders reacted to accrual signals immediately after the 10-K/Q filing. This paper studied US data in the period from 1990 to 1999 and found that investors who initiated large trades responded immediately to accruals information. The results indicated that large traders - who initiate trades of 5000 shares or more – responded immediately to the accrual information, while small traders responded as they are not aware of the accruals component. The paper also found that large traders' response was conditional on the firms' positive earnings surprise.

Overall, the previous studies demonstrate that institutional investors play a role in enhancing market efficiency and eliminating the anomalies in the capital market. This role is justified by their superior abilities and higher access to information, in-house resources and professionals compared with individual investors. Thus, institutional investors are viewed as sophisticated users of the financial information. This is justified by the higher ability to trade in large blocks of stocks, higher level of experience, and

greater access to information resources (e.g., El-Gazzar, 1998). Among these resources are the in-house buy-side analysts in addition to sell-side analysts.

A number of academic studies have examined the interaction between institutional investors and sell-side analysts. Academic interest in the interaction between institutional investors and analysts came originally from the academics' interest in the efficiency of the capital market. Both analysts and institutional investors perceived to be sophisticated users of financial information, thus, they both play a key role in disseminating the information in the market. The analysts express their opinions through stock recommendations and other forecasts while institutional investors' trading behaviour indicates their expectations towards stock performance (Busse et al., 2012, Hendershott et al., 2015).

The institutional investors' reliance on analysts has generated a number of academic papers.[8] From the analysts' standpoint, there is consistent evidence that they target institutional investors in their research. Brown et al. (2015) documented in a survey of sell-side analysts that they ranked mutual funds and hedge funds as their most important clients. Thus, this study concluded that analysts' research is designed to satisfy the needs of large institutional investors. This finding corresponds with previous studies that analysts are guided by their career concerns (Ljungqvist et al., 2007). Specifically, research in this area showed that the All-star ranking is considered to be one of the most important factors in determining the analysts' reputations, compensation levels, and future career outcomes (Groysberg et al., 2011). This Institutional Investors ranking is

[8] E.g., O'Brien and Bushan, 1990, Walther, 1997, Bonner et al., 2003, Chen and Cheng, 2006, Malmendier and Shanthikumar, 2007, Mikhail et al., 2007, Ljungqvist et al., 2007, Mehran and Stulz, 2007, Malmendier and Shanthikumar, 2014.

an annual survey that is filled by buy-side institutional investors to evaluate analysts' performance (Mehran and Stulz, 2007). Further, institutional investors are found to influence the decision of their portfolio managers in the allocation of trading commissions between analysts (Ljungqvist et al., 2007).

There is much debate about the usefulness of analysts' research among institutional investors. On one hand, institutional investors should trade based on the analysts' reports due to their profitability and informativeness (e.g., Womack, 1996, Jegadeesh et al., 2004). Further, institutional investors pay soft-dollars commissions to large brokerage houses to benefit from timely access to analysts' research (Chen and Cheng, 2006). On the other hand, institutional investors are aware of concerns among academics and regulators about the bias in the analysts' research.[9] Moreover, reliance on publicly-available information such as analysts' stock recommendations signals low managerial skills (Kacperczyk and Seru, 2007). Thus, a key question is: To what extent do institutional investors respond to analysts' research?

2.5.5 Interaction between Sell-Side Analysts and Buy-Side Institutional Investors

Analysts disseminate financial information to various users, including institutional investors. Institutional investors' demand for financial information motivates analysts to follow the firms to benefit from the trading commissions (O'Brien and Bhushan, 1990). Further, brokerage houses' dependency on institutional investors for trading commissions leads to a high association between the informativeness of analysts'

[9] Section 2.2 discusses in depth the main reasons behind the analysts' biased behaviour.

research and the percentage of shares held by institutional investors (Frankel et al., 2006). This relationship between analysts and institutional investors has led to a field of research that studies the relative importance of various types of analysts' outputs to institutional investors such as earnings forecasts, stock recommendations and target prices.

2.5.5.1 Institutional Investors' Response to Earnings Forecasts

Earnings forecasts are superior to time series models in predicting earnings (e.g., Fried and Givoly, 1982, Brown et al., 1987). Thus, a number of studies have proposed that more sophisticated users were abler to interpret analysts' forecasts and trade based on it. For example, Walther (1997) proposed that more sophisticated investors would rely on analysts' earnings forecast. This study analysed 89,246 quarterly earnings forecast observations between 1980 and 1995. The results showed that institutional investors as proxy of sophisticated users of financial information would rely more on analysts' earnings forecasts than on time series. This study specifically found that the presence of more sophisticated investors (not the accuracy of the earnings' forecast) explained the reliance on the analyst's earnings forecast. This result was explained by arguing that institutional investors are more informed, have greater access to analysts' forecasts and greater ability to understand them.

In addition, Bonner et al. (2003) found that more sophisticated investors had knowledge of the overall and specific factors that affected the accuracy of earnings due to their experience, ability to learn and the large number of firms they followed during the period between 1981 and 1999. In this study, a composite measure was built to proxy the sophistication of investors using five different variables: number of analysts

following the firm, percentage of shares owned by institutions, number of institutions investing in the firm, number of shares held by institutions, and dollar value of shares traded to proxy the size of the firm.

Further, Malmendier and Shanthikumar (2014) argued that large institutional investors are aware of the biased stock recommendations the analysts' issued as a result of conflict of interest; thus, they rely on earnings forecasts but not on stock recommendations. The study proposed that analysts appeared to intentionally bias their stock recommendations, which target individual investors, but not earnings forecasts which are useful for large institutional investors.

2.5.5.2 Institutional Investors Response to Stock Recommendations

The main output of analysts' research is stock recommendations. Early literature in this area documented market reactions to stock recommendations (e.g., Womack, 1996). Yet, the credibility and usefulness of these recommendations has been heavily questioned (e.g., Lin and McNichols, 1998, Francis and Philbrick, 1993, Michaely and Womack, 1999). Based on the earlier arguments, a number of scholars have proposed that institutional investors traded based on the analysts' recommendations and generated abnormal returns (e.g., Chen and Cheng, 2006, Green, 2006), while others argued that institutional investors are aware of the optimistically biased analyst stock recommendations. Institutional investors, therefore, will downgrade and adjust their reactions to the stock recommendations (Mikhail et al., 2007, Malmendier and Shanthikumar, 2007).

For instance, Chen and Cheng (2006) proposed that institutional investors do trade based on stock recommendations and that this is one of the reasons for their superior market performance. This study examines changes in institutional investors' holdings based on quarterly data during the period between 1994 and 1999. They found a 0.51% increase in institutional investors' holdings following favourable consensus stock recommendations. There was a -0.39% decrease response to unfavourable consensus stock recommendations. This study also found that changes in institutional investors' holdings that were explained by reliance on analysts' stock recommendations are positively associated with subsequent future returns. Moreover, Green (2006) argued that early access to stock recommendations provide institutional investors with profitable informational advantage. In particular, the study found that changes in analysts' recommendations were profitable for two hours before public release.

Consistent with previous studies, Irvine et al. (2007) argued that analysts give the institutional investors early recommendations prior to the public release of analysts' reports. This prediction is motivated by analysts' incentives to please buy-side institutional investors and the absence of regulations preventing this form of early interaction between analysts and institutional investors. Regulation FD prohibited analysts from interacting privately with managers. Yet, this regulation did not prohibit analysts from communicating privately with institutional investors' money managers. Thus, this study examined the trading behaviour of institutional investors before buy and strong-buy stock recommendations were publicly released to all investors in the capital market. This study found that institutional investors' trading showed a significant increase up to five days before the release of buy and strong buy recommendations. In contrast, Busse et al. (2012) did not support that analysts gave institutional investors

early information prior to the initiation of the stock recommendations. In addition, the study found that the revisions of analysts' recommendations convey useful information for buy-side institutional investors.

While the aforementioned papers demonstrated the reliability of stock recommendations to institutional investors, Mikhail et al. (2007) argued that institutional investors are aware of analysts' biased behaviour. Thus, this study proposed that large institutional investors responded to the information implied in analysts' recommendation and earnings forecast revisions, unlike small investors who may be unaware of analysts' incentives to issue optimistic stock recommendations. By examining the response of small and large investors to stock recommendations and earnings forecasts revisions between 1993 and 1999, this study found small investors reacted to buy/upgrade more than they reacted to hold/sell or downgrade. The findings also showed small investors had negative returns in general. Yet, large institutional investors trading based on the information communicated in both stock recommendations and earnings forecasts revisions yielded profitable trading strategies.

Similarly, Malmendier and Shanthikumar (2007) found that large investors were aware of previously documented analysts' optimistic recommendations and, accordingly, downgraded their response to stock recommendations. In this paper, event study was applied to examine the trade reaction to generate abnormal returns based on analysts' recommendations for small and large traders. This study shows small individual investors followed the stock recommendations literally while large institutional investors downgraded their response to the recommendation based on their awareness of the analysts' biased behaviour.

Yet, Ljungqvist et al. (2007) argued that the presence of institutional investors – as key customers of analysts' research - discipline the analysts. This proposition is based on the role the institutional investors play in shaping the analysts' careers. The institutional investors are responsible for the trading commissions and All-star ranking. Thus, the study examined a comprehensive sample of U.S. firms between 1994 and 2004 to examine the effect of institutional investors on biased stock recommendations. They documented a negative association between institutional ownership and biased affiliated stock recommendations, and a positive association between earnings forecast accuracy and institutional holding. This was in addition to the higher response to bad news in the presence of institutional ownership. This positive impact of the presence of institutional investors is explained by their impact on analyst career outcomes.

Lastly, Brown et al. (2014) proposed that mutual fund managers do herd when they are following analysts' stock recommendation revisions. In particular, this study found that mutual fund managers displayed a higher tendency to herd following downgrades in stock recommendation revisions compared with upgrades due to their career concerns. The high rate of competition between mutual fund managers and the evaluation process against the benchmark increase the herding behaviour of institutional investors. This study also found that mutual fund managers' herding behaviour had a negative impact on stock returns in the subsequent period. The latter results are consistent with the prediction that overacting to analysts' revisions caused by reputational herding can destabilise stock prices and move prices away from fundamentals.

The prior studies resulted in mixed results regarding the usefulness of analysts' stock recommendations. These mixed results can be justified by the well-documented debate regarding the usefulness of stock recommendations. Analysts' stock recommendations' credibility and reliability has generated a sufficient amount of interest in the analysts' literature.[10] These mixed results motivated the researchers to study less biased analysts' products such as target prices.

2.5.5.3 Institutional Investors Response to Target Prices

Analyst research reports include earnings forecasts, stock recommendations and target prices. Yet the target prices attracted less academic research despite the relative importance of this forecast. Thus, Lin et al. (2016) studied the usefulness of target prices to institutional investors. This study found that institutional investors traded based on information contained in target prices after controlling for earnings forecasts, stock recommendations and other institutional trading determinants documented in the prior literature. These conclusions are based on a sample spanning 1999 to 2011. Institutional trading is more pronounced when the stock recommendations and target prices give consistent information. Yet, institutional investors' trading behaviour based on target prices revisions is not profitable. In addition, compared with dedicated and quasi indexed institutional investors, only transient institutional investors trade based on target price revisions. Moreover, Hashim (2015) confirmed Lin et al. (2016) conclusion and proposed that All-star ranking affects institutional investors' reliance on target prices.

[10] Section 2.2 discusses in detail the analysts' incentives to bias stock recommendations.

Contradicting the view that institutional investors discipline analysts' behaviour, Bilinski et al. (2018) argued that the presence of short-term institutional investors will negatively impact the behaviour of analysts by making them more likely to strategically issue optimistic target prices in order to transfer their over-priced shares to naïve individual investors. This paper argued that analysts attempt to please short-term institutional investors by issuing optimistic target prices but not optimistic earnings forecasts because the latter heavily determine the analysts' reputation. It also found that investors failed to detect the analysts' biased behaviour and, finally, it proposed that short-term investors compensate the analysts who engaged in this biased behaviour through trading commissions.

In conclusion, prior studies have inferred that institutional investors rely on analysts' output as more informed users. Thus, they are viewed as sophisticated investors in the capital market. Besides being sophisticated, institutional investors' ownership in the U.S. equity market has increased significantly over the last thirty years. They are now the predominant players in the U.S. capital market. Thus, in the last sub-section, I have covered many areas including the sophistociation of institutional investors, the behaviour of institutional investors in the capital market, and institutional preferences and their impact on stock returns. I also covered the previous studies examining the institutional investors' role in mitigating well-known anomalies, while the last strand of the relevant literature discussed the interaction between institutional investors and sell side analysts.

2.5.6 Summary and Conclusion

In conclusion, previous studies have summarised the recent trends in institutional investors' trading behaviour. The trading behaviour of institutional investors became a predominant area in the accounting and finance literature due to the large percentage of shares they hold in addition to the role they are supposed to play as rational users of accounting information. The prior section covered different aspects of institutional investors' behaviour including their preferences, sophistication, role in mitigating the anomalies and their reliance on the analysts' products. The majority of the presented studies have concluded that institutional investors behave in the financial market as sophisticated users (e.g., Bartov et al., 2000, Amihud and Li, 2006, Mikhail et al., 2007, Malmendier and Shanthikumar, 2014, Hendershott et al., 2015). This was justified by skilled in-house staff who are able to pick the profitable information and access various resources of financial information. Among them are the sell-side analysts' reports.

Sell-side analysts play a predominant role in the capital market. They are viewed as skilful users of financial information. The analysts' ability to generate useful information has caught the attention of academic and regulators in the past two decades. Their reports contain various products which were documented to be useful to institutional investors. The major outputs in this report are the earnings forecast, stock recommendation, target prices, supplementary forecasts and other quantitative and qualitative information. In recent years these have been accompanied with cash flow forecasts (Givoly et al., 2009). While prior studies analysed the relationship between institutional investors and analysts' earnings forecasts, stock recommendations and

target prices. To date, no study has examined the usefulness of the cash flow forecasts to institutional investors.

In the last two decades, analysts' tendency to supply cash flow forecasts has significantly increased, yet the usefulness and sophistication of these forecasts continue to be debated among academics. Thus, the sophistication of cash flow forecasts can be examined by its usefulness to institutional investors. If cash flow forecasts are informative, institutional investors will trade based on them. Therefore, in Chapter 4, I examine the usefulness of the cash flow forecasts by directly examining the institutional investors' response to them, in an attempt to move the ongoing debate regarding the usefulness and sophistication of cash flow forecasts.

Meanwhile, in Chapter 5 and Chapter 6, I examine the association between institutional investors and analysts' target prices by using two different angles. The two research questions were motivated by the puzzling conclusion made by Lin et al. (2016) that institutional investors' trading based on analysts target price revisions does not contribute to their profitability in the near future.

Therefore, in Chapter 5, I shed light on foreign institutional investors - as less informed investors compared with domestic investors - to test whether they respond to analysts target prices. More importantly, I test the profitability of this trading. In Chapter 6, I examine the herding behaviour of institutional investors surrounding analysts' target prices revisions. I also test whether different types of institutional investors behave differently in the market.

3 Sample Selection and Descriptive Statistics

This chapter aims to provide a general overview of the core sample used in this thesis and the main data sources. In addition, it provides frequency tables before applying the filters required to reach the final sample in each empirical chapter. Then, I provide a high-level descriptive statistic that provides deeper understanding for institutional ownership data. Lastly, I shed light on the sample selection process and filters for Chapter 4, Chapter 5, and Chapter 6.

3.1 Sell-side Analysts' Forecasts Variables

In order to study the usefulness of analysts' forecasts to institutional investors, this thesis uses analysts' forecasts from the I/B/E/S database. This database contains both analysts' individual and consensus earnings forecasts, stock recommendations, target prices and operating cash flow forecasts along with supplementary forecasts such as dividends and revenue forecasts. The thesis covers the period from January 2003 to December 2013. The rationale for starting the sample from January 2003 is to avoid any confounding effects of significant regulatory changes leading up to this date from Regulation FD and the Global Research Analyst Settlement agreement. With the approval of Rule 2711 and NYSE Rule 472, these changes aim to increase the objectivity of analysts, restore confidence in the capital market, and protect investors. In addition, examining the interaction between analysts and institutional investors in the post-regulation FD period presents a fruitful setting due to the assumed absence of private information from the management (Ke et al., 2008).

I start by collecting analysts' annual earnings forecasts, annual cash flow forecasts, stock recommendations, and target prices for all U.S. companies from I/B/E/S detail history files from January 2003 to December 2013. I/B/E/S detailed files provide more accurate numbers compared with those supplied by summary files (Ramnath et al., 2005) and overcome the issues of stale forecasts in the I/B/E/S consensus in the summary files (Brown, 1993, Ramnath et al., 2008).

To construct analysts' consensus forecasts, I keep the most recent forecast for each analyst issued no more than six months before and no less than two weeks prior to the end of the current quarter for each firm. Next, to calculate the revisions for earnings forecasts, target prices and cash flow forecasts, I scale analysts' forecasts by the consensus forecasts in the last quarter. These revisions can be interpreted as the percentage change of consensus analysts' forecasts in the current quarter. Yet, for the stock recommendations revisions, I take only the difference in the consensus recommendation between two adjacent quarters. Analysts' stock recommendations are scaled as follows: 5. Strong buy, 4. Buy, 3. Hold, 2. Sell and 1. Strong sell.

Next, observations with non-missing analysts' revisions are merged with monthly stock prices from the Centre for Research in Security Prices (CRSP) with share codes 10 and 11 and traded on NYSE, AMEX and NASDAQ. This provides an initial sample of 124,025 firm-quarter observations. Then, I exclude 20,966 firm-quarter observations in the financial services industry (SIC 6000-6999) and 11,191 firm quarter observations in the utility industry (SIC 4000-4999) leaving 91,868 firm-quarter observations. The yearly distribution of the firm quarter observations before and after excluding the financial and utility industries is presented in Table 3-1.

Table 3-1: Sample distribution by year

	Initial Sample	**(Financial and Utilities)**	**Adjusted Sample**
year	firm quarter observation	firm quarter observation	firm quarter observation
2003	8,208	(2,226)	5,982
2004	11,611	(3,107)	8,504
2005	12,203	(3,265)	8,938
2006	12,444	(3,359)	9,085
2007	12,521	(3,324)	9,197
2008	12,180	(3,175)	9,005
2009	11,220	(2,886)	8,334
2010	11,141	(2,792)	8,349
2011	11,057	(2,758)	8,299
2012	10,752	(2,644)	8,108
2013	10,688	(2,621)	8,067
	124,025	(32,175)	91,868

This table summarises the yearly sample distribution of listed U.S. companies with sufficient data from I/B/E/S before and after excluding financial and utility firms from the sample, for the period between the second quarter of 2003 and the fourth quarter of 2013.

Table 3-2 provides a deeper look at the sample after excluding financial and utility firms. For each quarter in the period between 2003 and 2013, I split the sample into five groups based on the analysts' following in this quarter. Then, I show the industry distribution for the ranked groups using the Fama-French 49 industry classification. Table 3-2 shows that the highest analysts' following are for the firms in the business services such as EBay. EBay, for instance, has 35 analysts following in the third quarter of 2003; followed by computer software firms such as Google and, afterwards, pharmaceutical firms such as Johnson & Johnson. The firm with the highest analysts' following in my sample is Apple with 56 analysts' following in the second quarter of 2003. Apple is classified in the computer hardware industry. Overall, this table shows that the analysts' following varies between industries.

Table 3-2: **Sample distribution by industry and analyst coverage ranking**

Fama-French 49 industry Classification	Analyst Coverage Ranking (from low to high)					
	1	2	3	4	5	Total
Agriculture	79	26	16	24	0	145
Food Products	348	210	267	396	243	1,464
Candy & Soda	56	24	37	116	190	423
Beer & Liquor	71	35	23	79	29	237
Tobacco Products	33	6	23	104	19	185
Recreation	156	145	121	163	49	634
Entertainment	361	292	203	294	421	1,571
Printing and Publishing	410	207	185	156	123	1,081
Consumer Goods	355	217	245	287	292	1,396
Apparel	242	279	288	342	113	1,264
Healthcare	636	443	353	515	507	2,454
Medical Equipment	1,178	1,129	739	604	531	4,181
Pharmaceutical Product	2,381	1,713	1,376	1,207	1,118	7,795
Chemicals	486	414	548	441	296	2,185
Rubber and Plastic Product	156	95	77	84	5	417
Textiles	138	35	41	31	24	269
Construction Material	315	341	267	298	161	1,382
Construction	282	295	294	312	255	1,438
Steel Works	484	297	248	245	226	1,500
Fabricated Products	60	35	72	58	9	234
Machinery	939	642	734	768	580	3,663
Electrical Equipment	746	512	391	290	201	2,140
Automobiles and Truck	476	329	279	352	272	1,708
Aircraft	51	76	126	120	222	595
Shipbuilding, Railroad Equipment	39	67	73	44	43	266
Defence	71	61	35	38	87	292
Precious Metals	85	29	37	25	55	231
Non-Metallic and Industry	208	126	60	57	19	470
Coal	30	35	33	52	175	325
Petroleum and Natural	808	605	674	998	1,753	4,838
Personal Services	398	368	310	273	210	1,559
Business Services	2,346	1,855	1,890	1,843	1,134	9,068
Computer Hardware	559	454	392	345	553	2,303
Computer Software	1,775	1,476	1,297	1,541	1,753	7,842
Electronic Equipment	1,944	1,331	1,168	1,366	1,727	7,536
Measuring and Control	686	574	306	407	233	2,206
Business Supplies	424	296	117	280	168	1,285
Shipping Containers	58	66	39	130	8	301
Wholesale	1,179	736	730	865	374	3,884
Retail	1,187	897	993	1,298	2,065	6,440
Restaurants, Hotels, Motels	473	377	286	387	772	2,295
Others	694	679	543	310	141	2,366
Total	23,403	17,829	15,936	17,543	17,157	91868

3.2 Institutional Ownership Data

At this point, the earlier sample is merged with quarterly institutional ownership data obtained from the Thomson Financial 13F. The SEC requires institutions with holdings of $100 million or more under management to file submissions quarterly if their equity position is greater than 10,000 shares or $200,000. Following Yan and Zhang (2009), I remove all firm year observations with holdings of more than 100% in any given quarter. Thus, I exclude 8,446 firm-quarter observations that do not have sufficient variables to calculate the main variables of interest. In addition, I place several filters on each empirical chapter sample based on the nature of the study, which will be discussed in detail in Section 3.2.3.

Institutional investors are a far more heterogonous group of investors. Bushee (2001) classifies institutional investors into four main groups based on their fiduciary responsibilities: bank trusts who face the most stringent fiduciary duties, pensions and endowments who face strict fiduciary responsibilities but are less restricted than banks, followed by insurance companies, and, investment advisers (including mutual funds) who face the least restrictions compared with the other groups.

In this thesis, and particularly in Chapter 4 and Chapter 6, I disaggregate the institutional investors based on their investment horizon to short-term and long-term as explained in Section 3.2.1 while, in chapter 5, I disaggregate the institutional investors to domestic and foreign based in the geographic presence of the institutional investor manager.

3.2.1 Institutional Investors' Classification

Institutional investors' holding data are obtained from the Thomson-Reuters 13F. In order to classify institutional investors based on their investment horizon, I follow Yan and Zhang (2009) by classifying institutional investors to short-term and long-term based on their average portfolio turnover ratio. The turnover ratio measures the institutional investors' persistence and the extent to which they change their positions over time. Specifically, each quarter, I first calculate the aggregate buy and aggregate sell for each institutional investor k as follows:

$$CR\_Buy_{kt}=\sum_{\substack{i=1 \\ Sk_{it}>Sk_{it-1}}}^{N_k} | S_{kit}PRC_{it}-S_{kit-1}PRC_{it-1}-S_{kit-1}\Delta PRC_{it} | \quad (3.1)$$

$$CR\_Sell_{kt}=\sum_{\substack{i=1 \\ S_{kit} \le S_{kit-1}}}^{N_k} | S_{kit}PRC_{it}-S_{kit-1}PRC_{it-1}-S_{kit-1}\Delta PRC_{it} | \quad (3.2)$$

Where,

S_{kit} is the number of shares held by investor k in stock *i* at the end of quarter t adjusted using the CRSP shares adjustment factor. PRC_{it} is the closing of price stock *i* at the end of quarter t adjusted using the CRSP price adjustment factor. S_{kit-1} is the number of shares held by investor k in stock *i* at the end of quarter t-1 adjusted using the CRSP shares adjustment factor. PRC_{it-1} is the closing price of stock *i* at the end of quarter t-1 adjusted using the CRSP price adjustment factor.

Then, I calculate the institutional investor k churn ratio for quarter t as follows:

$$CR_{kt}=\frac{\min(CR\text{-}Buy_{kt},CR\text{-}Sell_{kt})}{\sum_{i=1}^{N_k}\frac{S_{kit}PRC_{it}+S_{kit-1}PRC_{it-1}}{2}} \tag{3.3}$$

Next, I calculate the average churn rate for each k institutional investors over the past four quarters as follows:

$$AVG\_CR_{kt}=\frac{1}{4}\sum_{j=0}^{3}CR_{kt-j} \tag{3.4}$$

Based on the average churn ratio, each quarter, I classify institutional investors into three groups, whereby the group with the highest average churn rate is classified as short-term, and investors with lowest average churn rate classified as long-term.

3.2.2 Descrptive Statstics for Different Types of Institutional Investors

Table 3-3 and Table 3-4 show the relationship between the investment horizon, legal type and geographic presence of institutional investors. Table 3-3 reports the mean and the median for the percentage of institutional ownership and the number of institutional investor managers of different types of legal type composition for all, short- and long-term, institutions. The institutional investors' legal types were classified by Thomson Reuters and modified by Brian Bushee.[11]

11 Thomson-Reuters declared that the types of institutional investors is not reliable after 1998. I am thankful to Brian Bushee who modified the classification and made it available on his website: at: http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html

The average firm-quarter level of overall institutional ownership is 65%, represented by 168 institutional investor managers. This is comparable with Lin et al. (2016) who documents an average of 61.7% of institutional ownership represented by 176 institutional managers. After disaggregating institutional ownership to short- and long-term, the descriptive statistics show the average firm-quarter has around double the percentage of short- than long-term institutional investors. Specifically, on average, short-term/(long-term) institutional investors hold 28.4 %/(13.3%) of a firm's shares in a given quarter, represented by 69/(39) institutional investors.

Moreover, after disaggregating institutional investors based on their fiduciary responsibilities, Table 3-3 shows that the largest proportion of institutions in the current sample belongs to independent investment advisers (more than 47% of the shares outstanding and more than 73% of the overall institutional ownership), followed by banks who own 9.6% of the shares outstanding. Pensions and endowments, and insurance companies own, respectively, 2% and 2.7%. After classifying the institutional investors managers based on both their fiduciary responsibilities and investment horizon, Table 3-3 shows that 23.6% of the 28.4% short-term institutional ownership is held by an independent investment adviser. This table also shows that banks and pension and endowments are more long-term-oriented. These percentages are consistent with Bushee (2001) who argues that independent investment advisers face less fiduciary restrictions compared with banks and pensions and endowments. Therefore, the latter will be less active in the market and have a long-term horizon.

Table 3-3: Sample descriptive statistics for legal type of all, short-term and long-term institutional investors

Variables	Percentage of Institutional Ownership			Number of Institutional Managers	
	N	mean	p50	mean	p50
Total	83,422	65.0%	70.7%	168	109
Short-term	83,422	28.4%	27.9%	69	53
Long-term	83,422	13.3%	12.0%	39	20
Legal Type					
Banks	83,381	9.6%	9.2%	25	16
Independent Investment Advisor	83,418	47.6%	50.1%	109	68
Insurance Companies	79,341	2.7%	1.9%	10	8
Pensions and Endowments	82,598	2.0%	1.7%	12	9
Others	81,601	2.8%	1.7%	11	6
Short-term/Legal Type					
Banks	82,685	2.1%	1.4%	6	5
Independent Investment Advisor	83,375	23.6%	22.9%	53	40
Insurance Companies	77,698	1.4%	0.6%	4	4
Pensions and Endowments	48,417	0.2%	0.1%	2	1
Others	75,826	1.4%	0.6%	5	3
Long-term/Legal Type					
Banks	82,183	3.6%	3.1%	7	4
Independent Investment Advisor	82,932	8.0%	5.9%	21	8
Insurance Companies	65,647	0.3%	0.1%	3	2
Pensions and Endowments	79,790	1.0%	0.9%	5	4
Others	77,043	0.6%	0.3%	3	2

This table summarises the mean and median for the percentage of institutional ownership and the number of institutional investors' managers for different types of institutional investors.

Table 3-4 reports the mean and the median for the percentage of institutional ownership and the number of institutional investor managers disaggregated based on the geographic presence of institutional investor managers of different legal type composition and investment horizon. By doing this, the table sheds light on the main constituents of foreign institutional ownership in the U.S. equity market. Furthermore, it enhances our understanding of how they are expected to behave in the market. Table 3-4 shows that not all firm quarter observations have foreign institutional ownership given that only 80,355 of 83,422 observations have foreign ownership. Moreover, Table 3-4 shows that both short-term and long-term have almost the same percentage of institutional ownership. Yet, the average number of short-term institutional investors is larger, and they invested in a larger number of firms, as evidenced by the number of observations. Interestingly, after splitting the sample of foreign ownership based on legal

type, banks own the highest percentage of foreign institutional investors' ownership, followed by independent investment advisers, insurance companies and pension and endowments, respectively.[12]

Abdioglu et al. (2015), studying foreign ownership in the U.S. covering the period from 1999 and 2008, report that foreign institutional ownership levels increase to 8% in 2008. This is relatively larger than what I report in this thesis. Yet, the sample in Abdioglu et al. (2015) is limited for the constituent firms of the S&P 1500 index which is expected to have a larger percentage of foreign ownership.

[12] The slight differences in the means between Table 3-2 and 3-3 is due to the rounding issues in addition to the differences in the sample used to calculate the means due to the availability of data. For instance, the banks in table 3-2 have 9.2% ownership based on a sample of 83,381 quarter firm observations while domestic institutional investors own 7.4% based on a sample of 83,362; foreign institutional investors own 2.5% based on a sample of 74,762, which sums 9.9%.

Table 3-4: Sample descriptive statistics for domestic versus foreign institutional investors split based on legal type and investment horizon

Variables	Percentage of Institutional Ownership			Number of Institutional Managers	
	N	mean	p50	mean	p50
Total	83,422	65.0%	70.7%	168	109
Foreign	80,355	4.5%	3.9%	16	8
Domestic	83,422	60.7%	65.6%	152	101
Domestic/Investment Horizon					
Short-term	83,403	27.2%	26.6%	62	49
Long-term	83,380	12.5%	11.0%	36	19
Foreign /Investment Horizon					
Short-term	69,404	1.40%	0.70%	9	5
Long-term	43,471	1.30%	0.40%	5	3
Domestic/Legal Type					
Banks	83,362	7.4%	7.0%	22	15
Independent Investment Advisor	83,416	46.4%	48.6%	100	63
Insurance Companies	79,259	2.6%	1.8%	9	7
Pensions and Endowments	82,580	2.0%	1.7%	11	9
Others	81,199	2.1%	1.1%	9	5
Foreign/Legal Type					
Banks	74,762	2.5%	2.0%	3	2
Independent Investment Advisor	75,665	1.3%	0.6%	10	5
Insurance Companies & Foreign	31,765	0.3%	0.2%	3	2
Pensions and Endowments	30,170	0.2%	0.1%	2	2
Others	61,437	0.8%	0.3%	2	1

This table summarises the mean and median for the percentage of institutional ownership and the number of institutional investors' managers for different types of institutional investors.

3.2.3 Sample Selection Filters for Empirical Chapters

In this thesis, I examine the association between institutional investors and two types of analysts' outputs, namely analysts' cash flow forecasts in Chapter 4 and analysts' target price revisions in Chapter 5 and Chapter 6. To do so, I use the above-mentioned sample then I apply several filters taken from the literature to reach to the final sample. In this section, I present the initial sample along with the filters for each chapter to reach the final sample.

3.2.3.1 Sample Selection for Chapter 4

I start by collecting analysts' annual earnings forecasts, annual cash flow forecasts, stock recommendations, and target prices for all U.S. companies from I/B/E/S from the

second quarter of 2003 to the fourth quarter of 2013. I then remove all observations with insufficient information to calculate quarterly revisions in earnings forecasts, stock recommendations, or target prices, and restrict the sample to firms with non-missing share prices from CRSP with share codes 10 and 11. This provides us with an initial sample of 124,025 firm-quarter observations as shown in Table 3-5.

From this initial sample, I exclude 32,157 firm quarter observations in the financial services industry and utility industry. Next, I remove 8,446 firm-quarters with insufficient data on Thomson-Reuters 13F institutional holding database required to calculate the main institutional trading variables; then, following Jiang (2010) and Edelen et al. (2016) 12,855 firm-quarters with a closing stock price of less than five dollars. Finally, I remove 15,388 firm-quarters missing the data requirements from CRSP or COMPUSTAT necessary to estimate the control variables, leaving us with a final sample of 55,179 firm-quarters in Table 3-5

Table 3-5: Chapter 4 Sample selection process

	Firm- Quarter Observations
Observations with share code 10 and 11 and have sufficient data from IBES	124,025
Less: firms in financial and utility industries	(32,157)
Less: firms with missing institutional holding information from 13F	(8,446)
Less: firms with a share price of less than 5 dollars	(12,855)
Less: firms with missing information to calculate the controlling variables from CRSP and COMPUSTAT	(15,388)
Final Sample	55,179

Note: This table shows the sample selection process followed, at the final sample of 55,179 U.S. firm-quarter between the second quarter of 2003 and the fourth quarter of 2013.

3.2.3.2 Sample Selection for Chapter 5

In Chapter 5, again, I start by collecting analysts' annual earnings forecasts, annual cash flow forecasts, stock recommendations, and target prices for all U.S. companies from I/B/E/S from the second quarter of 2003 to the fourth quarter of 2013. I then remove

all observations with insufficient information to calculate quarterly revisions in earnings forecasts, stock recommendations, or target prices, and restricted the sample to firms with non-missing share prices from CRSP, and with share codes 10 and 11. This provides us with an initial sample of 124,025 firm-quarter observations as shown in Table 3-6. From this initial sample, I exclude 32,157 firm quarter observations in the financial services industry and in the utility industry.

Next, I remove 8,446 firm-quarters with insufficient data on Thomson-Reuters 13F. In addition, for this chapter, I also remove 3,067 firm-quarter observations with missing foreign institutional holdings data. Since, in this chapter, I am interested in foreign institutional investors' trading, I restrict the sample to firm-quarter observations which have the data required to calculate the foreign institutional trading variables. In addition, for this chapter, I require the firm to be followed by at least three analysts.[13] Finally, I exclude observations missing the required data needed to calculate the control variables from CRSP and COMPUSTAT. The final sample, therefore, consists of 2,834 unique firms with 51,427 firm-quarter observations, as shown in Table 5-2.

Table 3-6: Sample selection for Chapter 5

	Firm - quarters observations
Initial sample from I/B/E/S from 2003 to 2013	124,025
Less: financial and utility firms	(32,175)
Less: firms missing institutional holding information from 13F	(8,446)
Less: firms missing foreign institutional trading information from 13F	(3,067)
Less: firms with less than three analysts' following	(14,778)
Less: firms missing information to calculate the controlling variables from CRSP and COMPUSTAT	(14,132)
Final Sample	51,427

Notes: This table shows the sample selection process followed to arrive at the final sample of 51,427 U.S. firm-quarters between the second quarter of 2003 and the fourth quarter of 2013.

13 I use the I/B/E/S earnings forecast summary file at the end of the quarter to determine the number of analysts following the firm.

3.2.3.3 Sample Selection for Chapter 6

I start by collecting analysts' annual earnings forecasts, stock recommendations, and target prices for all U.S. companies from I/B/E/S from the second quarter of 2003 to the fourth quarter of 2013. I then remove all observations with insufficient information to calculate quarterly revisions in earnings forecasts, stock recommendations, or target prices, and restrict the sample to firms with non-missing share prices from CRSP with share codes 10 and 11. This provides us with an initial sample of 124,025 firm-quarter observations, as shown in Table 3-7.

From this initial sample, I exclude 32,157 firm quarter observations in the financial services industry and utility industry. Then, I merge the sample obtained from I/B/E/S with firms which have sufficient data to calculate the institutional herding proxy. The institutional herding data are obtained from the Thomson-Reuters 13F institutional holding database in which firms' securities are identified by historical CUSIP, which allows merging with the data from I/B/E/S and CRSP. I also require the stock to be traded by at least five institutional traders each quarter to ensure that this measure reasonably captured the concept of a herd. Thus, I remove 12,513 firm-quarter observations with missing institutional holding data. Finally, I exclude observations missing the required data needed to calculate the control variables from CRSP and COMPUSTAT. The final sample, therefore, consists of 3,528 unique firms with 65,690 firm-quarter observations. Firm-quarters are shown in Table 3-7.

Table 3-7: Sample selection for Chapter 6

	Firm- Quarter Observations
Observations with share code 10 and 11 and have sufficient data from IBES	124,025
Less: firms in financial and utility industries	(32,157)
Less: firms with missing institutional holding information from 13F	(12,513)
Less: firms with missing information to calculate the controlling variables from CRSP and COMPUSTAT	(13,665)
Final Sample	65,690

Note: This table shows the sample selection process followed to arrive at the final sample of 65,690 U.S. firm-quarter between the second quarter of 2003 and the fourth quarter of 2013

Overall, this chapter highlights the main sources of data used in this thesis, sample distribution and shows high-level descriptive statistics for the institutional ownership main variables while the last section highlights a full explanation of the filters required to reach the final sample for each empirical chapter.

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4 Do Cash Flow Forecasts Contain Incremental Information for Institutional Investors ?

4.1 Introduction

Institutional investors are sophisticated investors (e.g., Battalio et al., 2012, Hendershott et al., 2015), characterised by their ability to trade in large blocks of stocks, and by their high level of investment expertise compared to retail investors (e.g., Bartov et al., 2000, Cohen et al., 2002, Amihud and Li, 2006). This enhanced expertise enables institutional investors to gather and process data from various sources in the pricing of securities. Among the many sources that institutional investors have access to, research reports issued by sell-side analysts are a key source of information.

Historically, analyst research reports have mainly included stock recommendations, earnings forecasts, and target prices. However, since 1993, a growing number of analysts have supplemented their earnings forecasts with cash flow forecasts. Analysts' reports, comprising both elements, increased on the I/B/E/S database from 1% in 1993 (DeFond and Hung, 2003) to 56.4% in 2008 (Call et al., 2013). This significant growth in the supply of analysts' cash flow forecasts has generated academic debate as to their quality and value to investors, as it is the demand from investors that is the most commonly cited explanation for the increase in the prevalence of cash flow forecasts (e.g., DeFond and Hung, 2003, Call et al., 2009).

However, to date, the usefulness, i.e., quality and value of cash flow forecasts, remains something of an open question (e.g., Givoly et al., 2009, Bilinski, 2014). Moreover, how

investors react to cash flow forecasts remains a largely unexplored area of research (Mangen, 2013). To date, the primary debate has focused upon the quality and efficacy of cash flow forecasts in enabling market participants to calculate accruals (e.g., Mohanram, 2014, Radhakrishnan and Wu, 2014), or on the sophistication of analysts' cash flow forecasts (e.g., Givoly et al., 2009, Call et al., 2013).

The debate surrounding the sophistication of cash flow forecasts leads to the question of: who are the key users of this information, and are these users sophisticated investors? Mangen (2013) states that investor sophistication is a key element in the debate over the usefulness of cash flow forecasts as investors are the primary users of analysts' work. Call et al. (2013) find cash flow forecasts are sophisticated and provide incremental information to market participants. Further, cash flow forecasts contribute to a decrease in the accrual's anomaly as the joint provision of earnings and cash flow forecasts allows for an estimation of future accruals (Mohanram, 2014, Radhakrishnan and Wu, 2014).

With respect to institutional investors, some studies provide evidence of the usefulness of analyst research to this group of investors. For example, Walther (1997) documents that institutional investors rely on analysts' earnings forecasts and Chen and Cheng (2006) find that institutional investors trade based on consensus stock recommendations. More recently, Lin et al. (2016) show that institutional investors respond to analysts' target prices.

Despite the insight into the interactions of institutional investors and analysts' outputs, extant studies do not consider the usefulness of cash flow forecasts to institutional investors. Analysing whether institutional investors respond to cash flow

forecast revisions is a useful environment to establish whether cash flow forecasts provide incrementally useful information. If sophisticated investors, such as institutional investors do, indeed, respond to changes in cash flow forecasts, then they must contain incremental information over and above that found in earnings, recommendations and target prices.

I, therefore, test the response of institutional investors to cash flow forecast revisions, and consider how cash flow forecasts influence the trading behaviour of institutional investors. To do so, I examine how institutional investors trade in response to cash flow forecast revisions, after controlling for revisions in analysts' earnings forecasts, stock recommendation, and target prices. In addition, I split institutional investors into short- and long-term investors to consider whether institutional trading differs by investment horizon.

The main findings of this chapter show that the presence of cash flow forecasts tempers institutional investors' response to earnings revisions, and that institutional investors' trade in the direction of cash flow forecast revisions. Crucially, after splitting institutional traders into short- and long-term investors, I find that only short-term institutional investors adjust their trading in response to cash flow forecast revision. These results hold after controlling for other analyst outputs and other factors relating to institutional trading, and after controlling for sample selection bias. Overall, the results of this chapter present evidence that analysts' cash flow forecasts convey incrementally useful information, and that this information affects the trading of institutional investors.

The rest of the chapter proceeds as follows. Section 4.2 discusses the literature and

develops the hypotheses; Section 4.3 discusses the methodology; Section 4.4 presents the descriptive statistics while Section 4.5 discusses the results; finally, Section 4.6 presents the concluding remarks.

4.2 Literature Review and Hypotheses Development

Since DeFond and Hung (2003), there has been an ongoing debate concerning the usefulness and sophistication of analysts' cash flow forecasts. This has generated two main lines of argument. The first proposes that cash flow forecasts are a source of incrementally useful information (e.g., Call, 2007, Call, 2008, Call et al., 2009, Pae and Yoon, 2011, McInnis and Collins, 2011, Yoo and Pae, 2013, Call et al., 2013, Mohanram, 2014, Radhakrishnan and Wu, 2014, Mao and Yu, 2015). The second, argues that cash flow forecasts provide no additional value over and above the information content of earnings forecasts (Givoly et al., 2009, Bilinski, 2014).

Call (2007) argues that the presence of cash flow forecasts would motivate investors to pay more attention to cash flow information in their financial accounts. Moreover, analysts have a monitoring role in issuing cash flow forecasts, as their inclusion encourages managers to provide more accurate and informative cash flow data, making the prediction of future cash flows easier (Call, 2008). Meanwhile, Call et al. (2009) demonstrate that the presence of cash flow forecasts increases the accuracy of earnings forecasts.

However, Givoly et al. (2009) argue that cash flow forecasts are simply naïve modifications of earnings forecasts. As such, they are unsophisticated and only weakly associated with stock returns. Moreover, Givoly et al. (2009) state that the difference

between earnings and cash flow forecast does not represent a forecast of accruals, which is a common assertion in the literature that argues for cash flow forecasts being incrementally useful. In response, Call et al. (2013) demonstrate that cash flow forecasts are not naïve replications of earnings forecasts, and that analysts make sophisticated adjustments for accruals to forecast cash flows.

Bilinski (2014) criticises the demand hypothesis proposed by DeFond and Hung (2003) and evidenced by Call et al. (2013) on the basis that cash flow forecasts depend on the accuracy of accruals and that accruals are simply one component of earnings. As such, it should be more challenging for analysts to predict the accrual component of earnings when earnings are of low quality. Consequently, analysts' cash flow forecasts are less useful when earnings quality is low.

Advocates of the usefulness of cash flow forecasts argue that cash flow forecasts help investors to price accruals accurately. The accrual anomaly has been a significant source of investigation by accounting scholars since the concept was introduced by Sloan (1996) whose seminal work argues that investors naively fixate their response on earnings, as they are unable to differentiate between the cash and accrual components of the earnings. Sloan (1996) documents a negative association between the accrual component of earnings and subsequent stock returns and calls this inefficiency in the stock market the "accrual anomaly."

The presence of the accrual anomaly has motivated scholars to examine whether sophisticated investors are able to identify the accrual anomaly and profitably trade on this information. Collins et al. (2003), for example, show that firms with high

institutional ownership have more accurate pricing of accruals. Institutional investors, therefore, have the capability to differentiate between accrual and cash components due to their superior analytical ability to price securities. Lev and Nissim (2006) also show institutional investors are aware of the accrual anomaly and profitably trade based on mispricing. Battalio et al. (2012) examine the speed of sophisticated investors in their response to accruals and find that large institutional traders react to accrual signals immediately after the 10-K/Q filing, while small individual traders respond incorrectly to the accrual signals.[14]

The ongoing debate on the quality and sophistication of cash flow forecasts leads to the question of who the key users of this information are. There is consistent evidence that analysts target sophisticated investors, such as institutional investors, with their research reports (e.g., Ljungqvist et al., 2007, Mehran and Stulz, 2007, Malmendier and Shanthikumar, 2014). Moreover, several studies document that institutional investors are informed users who trade based on analysts' outputs. For example, Chen and Cheng (2006) show that institutional investors earn significant abnormal returns by trading on analysts' consensus stock recommendations. Irvine et al. (2007) argue these abnormal returns are generated by institutional investors' trading on the pre-released buy and strong buy recommendations, given analysts' economic incentives to please institutional investors, who provide them with significant trading commissions.

Similarly, Ljungqvist et al. (2007) suggest that institutional investors are the main consumers of analysts' research, and are able to mitigate the biased recommendation

14 10-K is annual, and 10-Q quarterly filings that publicly traded companies submit to the Securities and Exchange Commission (SEC). These reports include financial information such as the audited financial statements and other market information.

problem. Further, institutional investors play a significant role in shaping the career outcomes of analysts, since they are responsible for their trading commissions as well as their ranking as All-star analysts. Analysts, therefore, have strong economic incentives to present institutional investors with informative research.

Mikhail et al. (2007) argue that large institutional investors respond to stock recommendation as sophisticated users. Specifically, they are net sellers after downgrades and net buyers after upgrades. By contrast, small individual investors respond positively to the occurrence of the analysts' revisions regardless of the type of recommendations. Further, Malmendier and Shanthikumar (2007) find large investors are aware of previously documented optimistic recommendations by analysts and downgrade their response to stock recommendations accordingly. Moreover, Lin et al. (2016) find that institutional investors' trade on information contained in target prices after controlling for earnings forecasts, stock recommendations, and other determinants of institutional trading.

I extend this line of enquiry and examine instititional investors' trading in the absence and presence of analysts' cash flow forecasts. Mohanram (2014) and Radhakrishnan and Wu (2014) propose that cash flow forecasts contribute to a decrease in accruals mispricing. Cash flow forecasts, accompanied by earnings forecasts, increase the awareness of investors to future accruals. However, Ecker and Schipper (2014) criticise these studies since, while they report the existence of cash flow forecasts reduces the accrual anomaly, they fail to provide evidence of how the information provided by cash flow forecasts improves investors' understanding of accruals. I, therefore, propose that if earnings forecasts, accompanied by cash flow forecasts, are useful for predicting

accruals, institutional investors will temper their response, instead of naïvely overreacting, to analysts' earnings revisions. The first hypothesis is, therefore:

H1a: *The presence of cash flow forecasts moderates institutional investors' response to earnings revisions*

Despite institutional investors being sophisticated users of financial information, they are not a homogenous group. Bushee (1998) argues institutional investors' investment horizon influences how they behave in the capital market, and classifies them into three main groups based on their investment horizons. The first group is transient institutional investors who tend to trade aggressively based on current market information, and own a highly diversified portfolio with a high turnover. The second group is dedicated institutional investors who invest largely in specific firms, and have a low portfolio turnover. The third group is quasi-indexers who are passive investors, and tend to hold diversified portfolios. Ke and Ramalingegowda (2005) rely on Bushee's (1998) characterisations and show only transient institutional investors are able to exploit post-earnings announcement drift to earn positive abnormal returns. Further, Yan and Zhang (2009) argue that short-term institutional investors are more informed traders, and Lin et al. (2016) document that only short-term institutional investors respond to target prices revisions. I, therefore, predict that, compared to long-term institutional investors, short-term institutional investors, characterised as sophisticated, active users of financial information, will temper their response more to analysts' earnings revisions accompanied by cash flow forecasts. The corresponding hypothesis is, therefore:

H1b: *The presence of cash flow forecasts has the greatest moderating effect on short-term institutional investors' response to earnings revisions*

Chapter 4: Do Cash Flow Forecasts Contain Incremental Information for Institutional Investors ?

Existing studies show institutional investors trade based on stock recommendation revisions, and target prices revisions (Chen and Cheng, 2006, Lin et al., 2016). Yet, how investors react to cash flow forecasts remains a largely unexplored area in this field of research (Mangen, 2013). Ecker and Schipper (2014) criticise early studies (Mohanram, 2014, Radhakrishnan and Wu, 2014) that examine the usefulness of cash flow forecasts based on the assumption that the existence of cash flow forecasts reduces the accrual anomaly. If cash flow forecasts do contain incremental information beyond analysts' earnings forecasts, I would expect institutional investors, as sophisticated users of analysts' research outputs, to respond to any changes in this information. I, therefore, hypothesise:

H2a: *Institutional investors trade in the same direction as cash flow forecast revisions*

Yan and Zhang (2009) and Yüksel (2015) argue that short-term institutional investors are better informed than long-term institutional investors. If short-term institutional investors are able to consistently identify overvalued or undervalued stocks, such institutions will trade more frequently. Further, short-term institutions have the capability of utilising their informational advantage or skill to gather and trade on short-run information on temporary mispricing. On the basis of the evidence of Bushee (1998) and Yan and Zhang (2009), I, therefore, examine whether, compared to long-term institutional investors, short-term institutional investors respond more to cash flow forecast revisions. The final hypothesis is therefore:

H2b: *Short-term institutional investors trade more than long-term institutional investors to cash flow forecast revisions*

4.3 Methodology

4.3.1 Impact of the Presence of Cash Flow Forecasts on Institutional Investors' Trading

Prior studies have documented a positive association between institutional trading and earnings revisions, stock recommendations, and target prices (Chen and Cheng, 2006, Lin et al., 2016). In addition, research has found institutional investors react in a timely and appropriate manner to accrual signals (e.g., Collins et al., 2003, Lev and Nissim, 2006, Battalio et al., 2012). I contribute to both strands of literature by examining the usefulness of the presence, and revisions of, analysts' cash flow forecasts to institutional investors. Therefore, to test the first hypotheses, I extend the methodology of Chen and Cheng (2006) and Lin et al. (2016) to examine the moderating effect of the presence of analysts' cash flow forecasts on institutional investors' response to earnings revisions as follows:

$$\Delta II_{it} = \beta_0 + \beta_1 CFF_{it} + \beta_2 \Delta EPS_{it} + \beta_3 CFF_{it} \times \beta_4 \Delta EPS_{it} + \beta_5 \sum CONTROL_{it} + \varepsilon_{it} \quad (4.1)$$

Where ΔII_{it} is estimated following Guo and Qiu (2016) as the quarterly percentage change in the number of institutional investors as:

$$\Delta II_{it} = \frac{II_{it} - II_{it-1}}{II_{it-1}} \times 100 \quad (4.2)$$

Where II_{it}: is either the number of all, short, or long-term institutional investors who hold stock i in quarter t, whereby short and long-term investors are classified, following Yan and Zhang (2009), based on their average portfolio turnover ratio over the past four

quarters.[15] By examining the quarterly changes in the number of institutional investors, I can test the moderating effect of the presence of analysts' cash flow forecasts on institutional investors' response to earnings revisions.

CFF_{it} is an indicator variable that equals one if analysts provide cash flow forecasts for firm i in quarter t, and zero otherwise. ΔEPS_{it} is the quarterly percentage change in analysts' average annual earnings forecast. $(CFF_{it} * \Delta EPS_{it})$ is the main variable of interest to test whether the presence of cash flow forecasts tempers institutional investors' response to earnings revisions, for which I predict a significant negative coefficient, and is estimated as the interaction between CFF_{it} and ΔEPS_{it}.

$\sum CONTROL_{it}$ includes controls, which are fully defined in Table 4-2, for several variables that are shown in the extant literature to influence institutional trading. First, following Chen and Cheng (2006) and Lin et al. (2016), I control for quarterly changes in stock recommendations (ΔREC_{it}) and target prices (ΔTP_{it}), which are shown to be positively associated with institutional trading. Next, following Gompers and Metrick (2001), I control for the quarterly changes in share turnover ratio ($\Delta TURN_{it}$), dividends (ΔDIV_{it}), and the natural logarithm of market value $LOG(MV_{it})$, which proxy for institutional investors preference towards liquid, prudent, and profitable stocks, which I expect to be postively associated with institutional trading.

15 Each quarter, I calculate the total purchases and sales of shares made by each institutional investor and use this to calculate the average churn over the past four quarters. Then, I use the average churn each quarter to group investors into short-term (the group with the highest average churn rate), or long-term (the group with the lowest average churn rate), institutional investors. See Yan and Zhang (2009) for a more detailed exposition of the methodology I followed to undertake this classification.

While institutional investors may buy stocks with a high book to market ratio (Gompers and Metrick, 2001), they may, instead, prefer glamour stocks (Sharma et al., 2008, Chen and Cheng, 2006). I, therefore, include a control for the book-to-price ratio (BP_{it}), but do not predict the direction of association with institutional trading. Further, following Chen and Cheng (2006), I control for institutional investors' preference for value and growth stocks, by including the price-earnings (PE_{it}) and sales growth (SG_{it}) ratios, which I expect to be postively associated with institutional trading.

Next, I control for momentum trading by including the cumulative stock return in the current (RET_{it}) and prior quarter LAG(RET_{it}) (Grinblatt et al., 1995), which I expect to be postively associated with institutional trading. Then, following Bennett et al. (2003), I control for institutional investors' appetite for risk by including the quarterly changes in beta ($\Delta BETA_{it}$), firms' specific volatility (ΔVOL_{it}), and firm idiosyncratic risk ($\Delta IRISK_{it}$). I predict a negative association between institutional trading and $\Delta BETA_{it}$, but a positive association between institutiounal trading and ΔVOL_{it} and $\Delta IRISK_{it}$. Finally, following Ke et al. (2008) and Lin et al. (2016), I control for the level of institutional ownership in the previous quarter.

Table 4-1: Variable Definitions

Variable	Definition
IO_Ttl_{it}	= The number of shares held by all institutional investors divided by the number of shares outstanding at the end of the quarter
IO_Shrt_{it}	= The number of shares held by short-term institutional investors divided by the number of shares outstanding at the end of the quarter
IO_Lng_{it}	= The number of shares held by long-term institutional investors divided by the number of shares outstanding at the end of the quarter
II_Ttl_{it}	= The number of all institutional investors in firm i in quarter t
II_Shrt_{it}	= The number of short-term institutional investors in firm i in quarter t
II_Lng_{it}	= The number of long-term institutional investors in firm i in quarter t
ΔII_Ttl_{it}	= The quarterly percentage change in the number of institutional investors (II_Ttl_{it})
ΔII_Shrt_{it}	= The quarterly percentage change in the number of short-term institutional investors
ΔII_Lng_{it}	= The quarterly percentage change in the number of long-term institutional investors
CFF_{it}	= Binary variable equal one if firm i have both cash flow and earnings forecasts during the quarter and zero when firm i only has earnings forecasts.
CPS_{it}	= The consensus cash flow forecast in quarter t calculated as the mean of the most recent distinct analysts target price in the last six months before the end of quarter t
ΔCPS_{it}	= The quarterly percentage change in CPS_{it}
EPS_{it}	= The consensus earnings forecasts in quarter t calculated as the mean of the most recent distinct analysts target price in the last six months before the end of quarter t
ΔEPS_{it}	= The quarterly percentage change in EPS_{it}
$CFF_{it}*\Delta EPS_{it}$	= The interaction term between ΔEPS_{it} and CFF_{it}
REC_{it}	= The analysts' consensus stock recommendation in quarter t, whereby recommendations are scaled as follows: 5. Strong Buy, 4. Buy, 3. Hold, 2, Sell and 1. Strong Sell.
ΔREC_{it}	= The quarterly change in REC_{it}
TP_{it}	= The consensus target price in quarter t calculated as the mean of the most recent distinct analysts target price in the last six months before the end of quarter t
ΔTP_{it}	= The quarterly percentage change in TP_{it}
$TURN_{it}$	= The average of the monthly turnover ratio over the past three months, whereby the monthly turnover ratio is calculated as the monthly trading volume divided by the number of shares outstanding at the end of the month
$\Delta TURN_{it}$	= The quarterly change in $TURN_{it}$
DIV_{it}	= The average dividend yield over 12 months prior to the end of the quarter t
ΔDIV_{it}	= The quarterly change in DIV_{it}
MV_{it}	= The market value of equity calculated as the number of shares outstanding at the end of quarter t multiplied by the price at the end of quarter t
$LOG\ (MV_{it})$	= The natural logarithm of MV_{it}
BP_{it}	= The book value of common equity at the end of the quarter t-1 divided by the market value at the end of quarter t
PE_{it}	= Price to earnings calculated as the market value at the end of quarter t divided by total income before extraordinary items over the previous four quarters
SG_{it}	= Sales growth, calculated as the total sales over the last four quarters divided by the total sales over quarters t-8 to t-5, minus one.
RET_{it}	= Cumulative monthly compounded stock returns over last quarter
$LAGRET_{it}$	= The value of RET_{it} in the prior quarter
VOL_{it}	= Volatility is the standard deviation of the daily stock returns of firm i in quarter t.
ΔVOL_{it}	= The quarterly change in VOL_{it}
$BETA_{it}$	= Beta is calculated as the coefficients of a regression of the monthly return of firm i on the value-weighted index return over the 36 months prior to the end of quarter t.
$\Delta BETA_{it}$	= The quarterly change in $BETA_{it}$
$IRISK_{it}$	= Idiosyncratic risk calculated as the standard deviation of the residuals in a regression of the monthly return of the firm on the value-weighted index return over the 36 months prior to the end of quarter t
$\Delta IRISK_{it}$	= The quarterly change in $IRISK_{it}$
IO_Ttl_{it-1}	= The number of shares held by all institutional investors divided by the number of shares outstanding at the end of the prior quarter

4.3.2 Impact of Cash Flow Forecasts Revision on Institutional Investors' Trading

Ecker and Schipper (2014) criticise prior studies, which assume that the presence of cash flow forecasts reduces the accrual's anomaly, and calls for future work to examine the implied information content of analysts' cash flow forecasts. Therefore, I test the second hypotheses, of whether institutional trading is associated with analysts' cash flow forecast revisions, by modifying Equation (4.1) to include quarterly changes in analysts' annual cash flow forecasts as follows:

$$\Delta II_{it} = \beta_0 + \beta_1 \Delta EPS_{it} + \beta_2 \Delta CPS_{it} + \beta_3 \sum CONTROL_{it} + \varepsilon_{it} \quad (4.3)$$

Where ΔCPS_{it} is the quarterly percentage change in analysts' annual cash flow forecasts and all the remaining variables are as defined above. I expect ΔCPS_{it} to have a positive coefficient if analysts' cash flow revisions provide institutional investors with incremental information.

4.4 Data and Sample Statistics

I start by collecting analysts' annual earnings forecasts, annual cash flow forecasts, stock recommendations, and target prices for all U.S. companies from I/B/E/S from the second quarter of 2003 to the fourth quarter of 2013.[16] I then remove all observations with insufficient information to calculate quarterly revisions in earnings forecasts, stock

[16] I start the sample period in the second quarter of 2003 to avoid any confounding effects of significant regulatory changes leading up to this date from Regulation FD and the Global Research Analyst Settlement agreement. With the approval of Rule 2711 and NYSE Rule 472, these changes aimed to increase the objectivity of analysts, restore confidence in the capital market, and protect investors.

recommendations, or target prices, and restrict the sample to firms with non-missing share prices from CRSP, traded on NYSE, AMEX, and NASDAQ, and with share codes 10 and 11. This provides us with an initial sample of 124,025 firm-quarter observations as show in Table 4-2.

From this initial sample, I exclude 20,966 firm quarter observations in the financial services industry and 11,191 firm quarter observations in the utility industry. Next, I remove 8,446 firm-quarters with insufficient data on the Thomson-Reuters 13F institutional holding database required to calculate the main institutional trading variables.[17] Then, following Jiang (2010) and Edelen et al. (2016) 12,855 firm-quarters with a closing stock price of less than five dollars.

Finally, I remove 15,388 firm-quarters missing the data requirements from CRSP or COMPUSTAT necessary to estimate the control variables, leaving a final sample of 55,179 firm-quarters in Table 4-2 and I winsorize all continuous variables at the 1% and 99% level to minimise the effect of outliers.

Table 4-2: Sample selection

	Firm- Quarter Observations
Observations with share code 10 and 11 and have sufficient data from IBES	124,025
Less: firms in financial and utility industries	(32,157)
Less: firms with missing institutional holding information from 13F	(8,446)
Less: firms with a share price of less than 5 dollars	(12,855)
Less: firms with missing information to calculate the controlling variables from CRSP and COMPUSTAT	(15,388)
Final Sample	55,179

Note: This table shows the sample selection process followed to arrive at the final sample of 55,179 U.S. firm-quarter between the second quarter of 2003 and the fourth quarter of 2013.

[17] The SEC requires institutions with holdings of $100 million or more under management to file submissions quarterly if their equity position is greater than 10,000 shares or $200,000. Following Yan and Zhang (2009), I removed all firm year observations with holdings of more than 100% in any given quarter. I also require the firm to have short-term and long-term trading variables to ease the comparability between regressions.

4.4.1 Descriptive Statistics

Table 4-3 reports the annual distribution of the sample for the number of firm-quarters with analysts' earnings revisions and cash flow forecasts, and without analysts' cash flow forecasts, from the second quarter of 2003 to the fourth quarter of 2013. Over the sample period, the proportion of firm-quarters accompanied by analysts' cash flow forecasts rises steadily from 51% in 2003 to 66% by the end of the sample period in 2013, consistent with prior studies (e.g., Call et al., 2013, Radhakrishnan and Wu, 2014).

Table 4-3: Firm-quarter distribution of earnings and cash flow forecasts over time

Year	Total Firm-quarters	Firm-quarters with earnings and cash flow forecasts	Firm-quarters with only earnings forecasts	Percentage of firm-quarters with earnings and cash flow forecasts
2003	4,062	2,081	1,981	51%
2004	5,697	2,989	2,708	52%
2005	5,537	3,059	2,478	55%
2006	5,290	2,956	2,334	56%
2007	4,736	2,702	2,034	57%
2008	4,234	2625	1,609	62%
2009	4,712	3008	1,704	64%
2010	5,266	3,397	1,869	65%
2011	5,260	3,491	1,769	66%
2012	5,185	3,429	1,756	66%
2013	5,200	3,452	1,748	66%

Notes: This table summarises the sample distribution of analysts' earnings revisions, with and without cash flow forecasts, for listed U.S. companies between the second quarter of 2003 and the fourth quarter of 2013.

Descriptive statistics for the key variables are reported in Table 4-4, showing institutional investors hold 72% of the shares (IO_Ttl) for the average firm-quarter, represented by 203 institutional investors (II_Ttl). Further, the quarterly percentage change in the number of institutional investors (ΔII_Ttl) shows an average increase of 2.3% over the sample period, in line with the growth of U.S. institutional ownership in recent years (Guo and Qiu, 2016). Splitting institutional investors according to their

investment horizon shows the average firm-quarter has around double the percentage of short-term than long-term institutional investors. Specifically, on average, short-term/(long-term) institutional investors hold 30%/(15%) of a firm's shares in a given quarter, represented by 82/(48) institutional investors, justifying the decision to separately analyse the quarterly trading pattern of these two groups of investors. Further, short and long-term institutional investors have increased their average quarterly holdings over the sample period by 2.7% (ΔII_Shrt) and 2.5% (ΔII_Lng) respectively, reflecting the growth in both short and long-term institutional investors in the U.S. market (Yüksel, 2015).

Statistics for analysts' outputs shows cash flow forecasts were issued for 60% (CFF) of the sample, a proportion that is consistent with other recent studies analysing analysts' cash flow forecasts. Further, the average firm received earnings forecasts of $1.48, consensus stock recommendation of 3.76 (REC), and target price of $33.55 (TP). An analysis of the quarterly change in these outputs over the sample period shows that while analysts appear to raise their average earnings forecasts and target prices, they lower their consensus stock recommendations.

The control variables show that the sample has a small number of large firms as shown by an average/(median) market capitalisation of $5,819 billion/($1,095 billion) at the end of the quarter. Further, the average firm reports a book value of little under half their market value shown by the BP ratio of 46%, a dividend yield of 8.5%, cumulative return of 6%, and growth in sales of 13.2%. The measure for share turnover (TURN) shows, on average, 21.3% of a firm's shares were traded over the quarter. For the measures used to proxy the risk, average volatility (VOL_{it}) in the current quarter is 2.5%,

average beta ($BETA_{it}$) is 1.37, and average firm specific risk ($IRISK_{it}$) is 11.2%, while the average change in these variables is close to zero, consistent with Chen and Cheng (2006) and Hashim (2015).

Table 4-4: Pooled descriptive statistics

Variable	N	P25	Mean	Sd	P50	P75
Panel (A) Institutional investors variables						
IO_Ttl_{it}	55,179	61%	72%	19%	76%	86%
IO_Shrt_{it}	55,179	21%	30%	13%	30%	39%
IO_Lng_{it}	55,179	9%	15%	8%	14%	20%
II_Ttl_{it}	55,179	87	203	201	134	240
II_Shrt_{it}	55,179	41	82	58	65	108
II_Lng_{it}	55,179	16	48	68	25	47
ΔII_Ttl_{it}	55,179	-3.968	2.256	10.309	1.205	6.957
ΔII_Shrt_{it}	55,179	-7.285	2.711	16.433	0	10
ΔII_Lng_{it}	55,179	-6.25	2.538	15	0	10
Panel (B) Analysts' forecasts variables						
CFF_{it}	55,179	0	0.601	0.49	1	1
EPS_{it}	55,179	0.452	1.475	1.755	1.11	2.119
ΔEPS_{it}	55,179	-0.051	0.012	0.572	0.01	0.097
$CFF_{it} \times \Delta EPS_{it}$	55,179	0	0.01	0.389	0	0.024
REC_{it}	55,179	3	3.67	0.71	3.667	4
ΔREC_{it}	55,179	-0.268	-0.007	0.626	0	0.25
TP_{it}	55,179	14.75	33.574	29.551	25	42.125
ΔTP_{it}	55,179	-0.933	0.802	4.862	0.6	2.679
Panel (C) Control variables						
$TURN_{it}$	55,179	0.101	0.213	0.171	0.164	0.267
$\Delta TURN_{it}$	55,179	-0.043	0.001	0.112	-0.001	0.043
DIV_{it}	55,179	0	0.085	0.174	0	0.108
ΔDIV_{it}	55,179	0	0.002	0.012	0	0
MV_{it} (in millions)	55,179	398	5,819	15,442	1,095	3,696
$LOG(MV_{it})$	55,179	5.987	7.197	1.611	6.999	8.215
BP_{it}	55,179	0.243	0.463	0.32	0.394	0.613
PE_{it}	55,179	9.577	16.853	59.4	17.573	26.72
SG_{it}	55,179	0.008	0.132	0.259	0.092	0.203
RET_{it}	55,179	-0.068	0.06	0.212	0.047	0.166
$LAG(RET_{it})$	55,179	-0.073	0.059	0.22	0.044	0.166
VOL_{it}	55,179	0.017	0.025	0.012	0.023	0.031
ΔVOL_{it}	55,179	-0.005	-0.001	0.01	-0.001	0.004
$BETA_{it}$	55,179	0.802	1.377	0.838	1.246	1.795
$\Delta BETA_{it}$	55,179	-0.099	0	0.251	0.004	0.108
$IRISK_{it}$	55,179	0.072	0.112	0.054	0.1	0.138
$\Delta IRISK_{it}$	55,179	-0.005	-0.002	0.009	-0.001	0.002
IO_Ttl_{it}-1	55,179	0.606	0.711	0.192	0.756	0.856

Notes: This table summarises the main sample statistics of key variables for the 55,179 firm-quarter observations in the sample of listed U.S. companies between the second quarter of 2003 and the fourth quarter of 2013. See Table 4-1 for variable definitions.

Table 4-5 reports the mean and the median for the sample of firm-quarters according to whether the firm-quarter was accompanied by both analysts' cash flow and earnings forecasts, or only analysts' earnings forecasts. The last two columns present the results of univariate tests to compare the means between the two groups. This shows that, compared to firm-quarters without cash flow forecasts, firm-quarters with cash flow forecasts have a higher level of total (IO_Ttl), short (IO_Shrt), and long-term (IO_Lng) institutional ownership. Further, Table 4-5 shows that, compared to firm-quarters without cash flow forecasts, firm-quarters with cash flow forecasts have a higher number of institutional investors (II_Ttl) and a lower change in the number of institutional investors (ΔII_Ttl).

An analysis of analysts' outputs shows that compared to firm-quarters without cash flow forecasts, firm-quarters with cash flow forecasts have significantly higher earnings per share (EPS) and target prices (TP). Further, firms with cash flow forecasts show greater quarterly changes in analysts' earnings forecasts (ΔEPS), target prices (ΔTP), and stock recommendations (ΔREC).

Moreover, a comparison of the control variables in Table 4-5 reveals significant differences between firms with and firms without cash flow forecasts. Specifically, compared to firm-quarters without cash flow forecasts, firm-quarters with cash flow forecasts are more liquid, pay more dividends, and have larger market capitalisation. Moreover, firm-quarters without cash flow forecast are riskier than firm-quarters with cash flow forecasts, have higher sales growth, and higher book to market ratios. In sum, these differences suggest analysts' decisions to issue cash flow forecasts may be non-random and, therefore, require us to control for sample-selection bias.

Table 4-5: Descriptive statistics based on the presence of cash flow forecasts

	Firm-quarters with only earnings forecasts			Firm-quarters with earnings and cash flow forecasts			Mean Difference	
Variable	**N**	**mean**	**p50**	**N**	**mean**	**p50**	**Diff**	**t-stat**
Panel (A) Institutional Investors Variables								
IO_Ttl_{it}	21,990	66%	70%	33,189	75%	78%	-0.093***	(-58.55)
IO_Shrt_{it}	21,990	28%	27%	33,189	32%	32%	-0.041***	(-36.75)
IO_Lng_{it}	21,990	13%	11%	33,189	17%	16%	-0.037***	(-52.56)
II_Ttl_{t}	21,990	97	89	33,189	274	199	-176.1***	(-111.42)
II_Shrt_{it}	21,990	46	42	33,189	106	92	-60.07***	(-137.04)
II_Lng_{it}	21,990	19	16	33,189	68	37	-48.83***	(-87.79)
ΔII_Ttl_{it}	21,990	3.247	1.613	33,189	1.599	1.034	1.648***	(18.44)
ΔII_Shrt_{it}	21,990	4.378	1.25	33,189	1.607	0	2.771***	(19.46)
ΔII_Lng_{it}	21,990	3.574	0	33,189	1.851	0	1.722***	(13.23)
Panel (B) Analysts' Forecasts Variables								
CPS_{it}	-	-	-	31,136	3.17	2.34	-	-
EPS_{it}	21,990	0.889	0.664	33,189	1.863	1.47	-0.975***	(-66.36)
ΔEPS_{it}	21,990	0.005	0.007	33,189	0.017	0.01	-0.013*	(-2.53)
$CFF_{it} \times \Delta EPS_{it}$	21,990	0	0	33,189	0.017	0.01	-0.017***	(-5.07)
REC_{it}	21,990	3.802	4	33,189	3.582	3.571	0.220***	(36.05)
ΔREC_{it}	21,990	-0.01	0	33,189	-0.005	0	-0.005	(-0.96)
TP_{it}	21,990	25.219	18	33,189	39.109	31	-13.89***	(-55.55)
ΔTP_{it}	21,990	0.695	0.333	33,189	0.872	0.778	-0.177***	(-4.19)
Panel (C) Controlling Variables								
$TURN_{it}$	21,990	0.177	0.13	33,189	0.237	0.186	-0.06***	(-40.84)
$\Delta TURN_{it}$	21,990	0.002	0	33,189	0	-0.001	0.002	(1.80)
DIV_{it}	21,990	0.055	0	33,189	0.105	0	-0.051***	(-33.97)
ΔDIV_{it}	21,990	0.001	0	33,189	0.002	0	-0.001***	(-11.61)
MV_{it} (millions)	21,990	786	412	33,189	9,154	2,577	-8366.9***	(-64.63)
$LOGMV_{it}$	21,990	6.086	6.022	33,189	7.933	7.854	-1.847***	(-159.33)
BP_{it}	21,990	0.494	0.429	33,189	0.443	0.374	0.051***	(18.36)
PEit	21,990	14.924	17.248	33,189	18.131	17.721	-3.207***	(-6.21)
SG_{it}	21,990	0.144	0.094	33,189	0.125	0.09	0.019***	(8.46)
RET_{it}	21,990	0.07	0.049	33,189	0.053	0.046	0.016***	(8.81)
$LAGRET_{it}$	21,990	0.072	0.047	33,189	0.05	0.043	0.022***	(11.35)
VOL_{it}	21,990	0.028	0.026	33,189	0.024	0.021	0.005***	(45.87)
ΔVOL_{it}	21,990	-0.001	-0.001	33,189	0	-0.001	0.000	(-1.94)
$BETA_{it}$	21,990	1.444	1.305	33,189	1.332	1.213	0.113***	(15.47)
$\Delta BETA_{it}$	21,990	-0.001	0.004	33,189	0.001	0.003	-0.002	(-0.97)
$IRISK_{it}$	21,990	0.13	0.119	33,189	0.1	0.089	0.031***	(68.32)
$\Delta IRISK_{it}$	21,990	-0.003	-0.001	33,189	-0.002	-0.001	-0.001***	(-10.13)
INS_Ttl_{it-1}	21,990	0.651	0.689	33,189	0.751	0.785	-0.099***	(-61.67)

Notes: This table summarises the main sample statistics based on the existence or absence of analysts' cash flow forecasts. See Table 4-1 for variable definitions.

4.4.2 Controlling for Sample Selection Bias

I follow Radhakrishnan and Wu (2014) and Mohanram (2014), and control for selection bias by adopting the Heckman (1979) two-stage estimation procedure. For the first stage, I follow DeFond and Hung (2003) by estimating a probit regression model to explain the tendency of analysts to forecast cash flows for certain firms as follows:

$$CFF = \beta_0 + \beta_1 ABSACC + \beta_2 VOL + \beta_3 LOG(MV) + \beta_4 ALTMANZ + \beta_5 CAP\_INT + \beta_6 ACC\_CHOICE + \varepsilon \quad (4.4)$$

Where CFF is a binary variable, equal to one if analysts issue both cash flow and earnings forecasts for a given firm during the current quarter, and zero if analysts issue only earnings forecasts. ABSACC is the absolute value of total accruals reported in the current year, measured as the difference between income before extraordinary items and operating cash flows, divided by total assets. VOL is the earnings volatility of firm i in the current year, measured as the coefficient of variation of earnings over the previous four years, but requiring a minimum of two years' available data. The coefficient of variation is calculated as the absolute value of the standard deviation of earnings divided by the average earnings, where earnings is the earnings before extraordinary items scaled by the beginning stock price. LOG(MV) is the natural logarithm of the market value of equity at the end of the current year. ALTMANZ is Altman Z-score estimated in the prior year as 1.2*(net working capital/total assets) + 1.4*(retained earnings/total assets) + 3.3*(earnings before interest and taxes/total assets) + 0.6*(market value of equity/book value of liabilities) + 1.0*(sales/total assets). CAP_INT is the capital intensity estimated in the prior year as the ratio of gross property, plant, and equipment

divided by sales revenue. ACC_CHOICE is the accounting choice heterogeneity estimated in the prior year as an index ranging from zero to one by assigning a value of one to firms that use different accounting methods to the most prevalent method in their industry (using the Fama and French (1997) industry classifications). The accounting choices are (1) inventory valuation; (2) investment tax credit; (3) depreciation; (4) successful-efforts vs. full-cost for companies with extraction activities; and (5) purchase vs. pooling. I then sum the scores for all methods and standardise this by the number of available choices for each firm. A higher (lower) index value indicates heterogeneous (homogeneous) accounting choices.[18] Consistent with DeFond and Hung (2003) and Mohanram (2014), Table 4-6 shows a negative significant coefficient for ALTMANZ and positive coefficients for ABSACC, VOL, LOG(MV), CAP_INT and ACCT_CHOICE.

From the above estimation of the probit regression model, I then compute the inverse mills ratio (MILLS), which I include as a control for sample selection bias in Equation (4.1) and (4.3), along with ALTMANZ, ABSACC, and CAP_INT.[19]

[18] DeFond and Hung (2003) use annual data to examine the main determinants of analysts' propensity to issue cash flow forecasts. However, as the analysis is based on quarterly data, I merge the quarterly cash flow forecast variable CFF with the annual accounting data used to determine analysts' decision to issue cash flow forecasts.

[19] I exclude LOG(MV) and VOL as Equation (1) and (3) already include controls for firm size and earnings volatility. Further, I exclude ACCT_CHOICE since I do not expect a systematic relation between ACCT_CHOICE and institutional trading based on the presence of analysts' cash flow forecasts.

Table 4-6: Sample selection probit regression results

Variable	Predicted sign	CFF
ABSACC	+	0.947***
		(0.201)
VOL	+	0.009***
		(0.003)
LOG(MV)	+	0.673***
		(0.017)
ALTMAN Z	-	-0.022***
		(0.004)
CAP_INT	+	0.194***
		(0.024)
ACCT_CHOICE	+	0.103
		(0.075)
Constant	n/a	-4.529***
		(0.122)
N		55179
Pseudo R-squared		0.312

Notes: This table presents the results of the first stage probit regression model for the provision of cash flow forecasts using Equation (4.4). CFF is a binary variable that equal one if the firm i has both cash flow forecast and earnings forecasts during the quarter and zero when the firm i only has earnings forecasts. ABSACC is the absolute value of total accruals measured as income before extraordinary items minus operating cash flow divided by total assets. VOL is the firm's i earnings volatility in year t, measured as the coefficient of variation of earnings over the previous four years but ensuring that at least two years' data are available. The coefficient of variation is calculated as the absolute value of the standard deviation of earnings divided by the mean of earnings where earnings are the earnings before extraordinary items scaled by the beginning stock price. LOG (MV) is the natural logarithm of the market value of the equity. ALTMANZ is Altman Z score which is calculated as 1.2 (net working capital/total assets) + 1.4(retained earnings/total assets) + 3.3(earnings before interest and taxes/total assets) + 0.6(market value of equity/book value of liabilities) + 1.0(sales/total assets). CAP_INT is the capital intensity calculated as the ratio of gross property, plant, and equipment divided by sales revenue. ACC_CHOICE is the accounting choice heterogeneity estimated in the prior year as an index ranging from zero to one by assigning a value of one to firms that use different accounting methods to the most prevalent method in their industry (using Fama and French (1997) industry classifications). The accounting choices are (1) inventory valuation; (2) investment tax credit; (3) depreciation; (4) successful-efforts vs. full-cost for companies with extraction activities; and (5) purchase vs. pooling. The scores are then summed and divided by the number of the available choices. Standard errors are presented in parentheses, and are clustered on firm's level and are robust to heteroscedasticity and autocorrelation *** p<0.01, ** p<0.05, * p<0.1.

4.5 Empirical Results

I start by examining the percentage change in the number of institutional investors to test whether the presence of cash flow forecasts has a moderating effect on institutional trading around earnings revisions. Columns 1 of Table 4-7 show that CFF is significant and negative suggesting that institutional investors trade less in firms where cash flow forecasts are present compared to firms with no cash flow forecasts. In looking at ΔEPS,

this is positive and significant at the 1% level and as predicted by H1a, while the interaction term CFF*ΔEPS is negative and significant at the 1% level. This result shows that the response of institutional investors to earnings forecasts revisions is moderated by the presence of cash flow forecasts compared to stand-alone earnings revisions. This result is consistent with Mohanram (2014) and Radhakrishnan and Wu (2014) who assert that the presence of cash flow forecasts increases the market participants awareness of the accrual component of earnings, and this initial result shows that sophisticated investors respond in the manner predicted by their assertion.

I next separate institutional investors by their investment horizon following Yan and Zhang (2009). The results for short-term institutional investors (columns 3 and 4) shows that the presence of cash flow forecasts moderates their response to earnings forecasts, and there is less turnover in the number of short-term institutional investors. This is consistent with the prediction in H1b. For long-term institutional investors (columns 5 and 6) I also find a similar impact; however, the magnitude of the coefficient is much lower than for short-term institutional investors, and insignificant. Overall, the result is consistent with Yan and Zhang (2009) and Yüksel (2015) who show short-term institutional investors trade more on transient information, but, crucially for this chapter, the presence of cash flow forecasts moderates this trading behaviour, and so cash flow forecasts contain incrementally useful information for identifying mispriced securities.

Table 4-7: Regression of institutional trading on presence of cash flow forecasts

Variable	ΔII_Ttl (1)	ΔII_Ttl (2)	ΔII_Shrt (3)	ΔII_Shrt (4)	ΔII_Lng (5)	ΔII_Lng (6)
CFF_{it}	-0.309***	-0.170	-0.376***	-0.473***	-0.463*	-0.498**
	(0.086)	(0.133)	(0.114)	(0.137)	(0.244)	(0.224)
ΔEPS_{it}	0.461***	0.588***	0.806***	0.871***	0.086	0.038
	(0.107)	(0.084)	(0.189)	(0.134)	(0.170)	(0.126)
$\Delta EPS_{it} \times CFF_{it}$	-0.419***	-0.401***	-0.689***	-0.356*	-0.135	-0.094
	(0.150)	(0.121)	(0.256)	(0.195)	(0.214)	(0.184)
ΔREC_{it}	0.060	0.050	0.414***	0.370***	-0.323***	-0.286***
	(0.063)	(0.055)	(0.109)	(0.097)	(0.096)	(0.090)
ΔTP_{it}	9.976***	9.787***	17.690***	17.837***	3.304***	3.127***
	(0.432)	(0.315)	(0.732)	(0.550)	(0.633)	(0.513)
$\Delta TURN_{it}$	7.680***	7.654***	13.238***	13.891***	3.478***	2.363***
	(0.417)	(0.369)	(0.685)	(0.645)	(0.629)	(0.601)
ΔDIV_{it}	4.964*	3.884	7.993*	8.918*	6.349	3.735
	(2.708)	(3.040)	(4.748)	(5.318)	(4.103)	(4.954)
$LOG(MV_{it})$	-0.079	0.211	-0.291***	-1.106***	0.221***	1.430***
	(0.051)	(0.143)	(0.076)	(0.250)	(0.070)	(0.233)
BP_{it}	-1.352***	-2.774***	-0.779***	-2.767***	-2.055***	-2.163***
	(0.128)	(0.239)	(0.189)	(0.417)	(0.175)	(0.389)
PE_{it}	0.001*	0.001	-0.000	0.000	0.005***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
SG_{it}	1.612***	0.833***	0.746***	0.291	2.893***	1.644***
	(0.157)	(0.174)	(0.231)	(0.304)	(0.230)	(0.284)
RET_{it}	17.714***	16.468***	21.444***	20.145***	10.796***	9.691***
	(0.338)	(0.247)	(0.569)	(0.431)	(0.485)	(0.402)
$LAGRET_{it}$	10.151***	9.133***	14.068***	13.236***	4.450***	3.287***
	(0.280)	(0.209)	(0.463)	(0.366)	(0.411)	(0.341)
ΔVOL_{it}	32.406***	33.803***	78.443***	82.055***	-6.589	-5.087
	(6.330)	(4.756)	(10.860)	(8.318)	(9.559)	(7.749)
$\Delta BETA_{it}$	-0.470***	-0.621***	-0.938***	-1.124***	0.367	0.285
	(0.170)	(0.140)	(0.276)	(0.245)	(0.261)	(0.228)
$\Delta IRISK_{it}$	-4.201	0.429	35.807***	39.368***	-27.379***	-22.453***
	(4.987)	(4.341)	(8.155)	(7.593)	(7.757)	(7.073)
IO_Ttl_{it-1}	-4.673***	-13.510***	-7.647***	-19.092***	-2.940***	-7.429***
	(0.261)	(0.452)	(0.379)	(0.790)	(0.309)	(0.736)
$MILLS_{it}$	0.583***	-0.227	1.159***	-0.236	2.240***	1.189**
	(0.195)	(0.331)	(0.291)	(0.580)	(0.267)	(0.540)
$ABSACC_{it}$	-0.731	0.129	1.253	1.124	-1.967**	-1.682
	(0.629)	(0.674)	(0.926)	(1.179)	(0.826)	(1.098)
CAP_INT_{it}	0.095**	-0.032	0.134**	0.002	0.249***	0.071
	(0.047)	(0.118)	(0.066)	(0.206)	(0.061)	(0.192)
Altman Z_{it}	0.002	0.044***	-0.041***	0.031	0.044***	0.088***
	(0.008)	(0.015)	(0.012)	(0.026)	(0.011)	(0.024)
Constant	3.051**	4.703	5.925***	32.856***	-6.553***	-26.831***
	(1.312)	(3.107)	(1.963)	(5.434)	(1.770)	(5.062)
N	55179	55179	55179	55179	55179	55179
Time Effect	YES	YES	YES	YES	YES	YES
Industry Effect	YES	NO	NO	YES	YES	NO
Firm Fixed Effect	NO	YES	YES	NO	NO	YES
Adj. R-squared	0.406	0.363	0.299	0.245	0.274	0.228

Notes: This table presents the regression results of the institutional trading (ΔII) on the presence of cash flow forecasts (CFF), earnings revision (ΔEPS), the interaction term (CFF*ΔEPS) and other controls. Standard errors presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1 are adjusted for firm level clustering, and are robust to heteroscedasticity and autocorrelation. See Table 4-1 for variable definitions.

Next, I examine the effect of cash flow forecasts revisions on the percentage change in the number of institutional investors and test whether institutional investors trade in the same direction as the cash flow revision. From Table 4-8 columns 1 and 2, institutional investors trade in the same direction as the cash flow forecast revision after controlling for other analyst outputs and other key determinants of institutional trading behavior. This is consistent with the prediction in H2a and suggests, again, that cash flow forecasts revisions contain useful incremental information over and above other analyst outputs.

As before, I next separate institutional investors by their investment horizon and present results for short-term institutional investors in columns 3 and 4, and long-term institutional investors in columns 5 and 6. From the results in columns 3 and 4 short-term institutional investors trade in the same direction as the cash flow revision and so there is a significant increase/decrease in the number of short-run institutional investors holding a stock depending on whether the cash flow revision was positive/negative. This finding is consistent with the view that short-term institutional investors trade on transient information and, again, shows that cash flow forecasts contain incrementally useful information above that found in earnings, target prices, and stock recommendations.

The final two columns of Table 4-8 examine long-term institutional investors. Interestingly, while the coefficient for ΔCPS is positive, it is not significant. As such, long-term institutions do not, therefore, undertake significant trading activity based on short-term cash flow revisions, which is consistent with their longer investment horizon.

Overall, the results show consistent evidence that the presence of cash flow forecasts influences the investment and trading behavior of institutional investors and so cash flow forecast disclosures contain incrementally useful information above earnings, target prices and stock reccomendations for investors.

Table 4-8: Regression of institutional trading on cash flow forecasts revisions

Variable	Δ II _Ttl (1)	Δ II _Ttl (2)	Δ II_Shrt (3)	Δ II_Shrt (4)	Δ II Lng (5)	Δ II Lng (6)
ΔEPS_{it}	0.401***	0.376***	0.709***	0.707***	-0.105	-0.121
	(0.100)	(0.077)	(0.162)	(0.134)	(0.147)	(0.125)
ΔCPS_{it}	0.301***	0.272***	0.440**	0.470***	0.148	0.088
	(0.111)	(0.092)	(0.188)	(0.161)	(0.169)	(0.150)
ΔREC_{it}	0.097	0.095	0.525***	0.543***	-0.116	-0.104
	(0.079)	(0.066)	(0.133)	(0.115)	(0.117)	(0.107)
ΔTP_{it}	12.699***	12.508***	21.954***	21.942***	3.515***	3.290***
	(0.582)	(0.412)	(0.971)	(0.721)	(0.825)	(0.671)
$\Delta TURN_{it}$	6.062***	5.914***	11.198***	11.273***	2.065***	1.587**
	(0.483)	(0.401)	(0.806)	(0.701)	(0.683)	(0.653)
ΔDIV_{it}	5.767**	2.714	5.334	3.562	11.494***	7.038
	(2.926)	(3.149)	(4.893)	(5.504)	(4.439)	(5.126)
$LOG(MV_{it})$	-0.077	-0.136	-0.349***	-1.361***	0.099	1.080***
	(0.053)	(0.153)	(0.074)	(0.267)	(0.073)	(0.249)
BP_{it}	-0.714***	-2.050***	-0.258	-2.204***	-1.371***	-1.862***
	(0.143)	(0.265)	(0.214)	(0.464)	(0.188)	(0.432)
PE_{it}	0.000	0.000	-0.002	-0.002	0.004***	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
SG_{it}	1.652***	0.845***	0.491*	-0.023	2.828***	1.425***
	(0.199)	(0.209)	(0.281)	(0.365)	(0.266)	(0.340)
RET_{it}	14.524***	13.902***	14.827***	14.295***	10.319***	9.609***
	(0.407)	(0.307)	(0.696)	(0.536)	(0.614)	(0.499)
$LAGRET_{it}$	7.022***	6.551***	9.837***	9.667***	2.446***	1.592***
	(0.345)	(0.254)	(0.555)	(0.444)	(0.506)	(0.414)
ΔVOL_{it}	36.259***	35.303***	54.148***	49.461***	16.081	18.577
	(8.575)	(7.049)	(14.354)	(12.320)	(13.397)	(11.473)
$\Delta BETA_{it}$	-0.666***	-0.802***	-1.150***	-1.402***	0.054	0.093
	(0.195)	(0.173)	(0.321)	(0.303)	(0.312)	(0.282)
$\Delta IRISK_{it}$	-3.597	4.619	28.318***	33.850***	-6.408	3.856
	(6.392)	(5.383)	(10.705)	(9.408)	(9.583)	(8.761)
IO_Ttl_{it-1}	-3.167***	-8.615***	-4.892***	-12.431***	-1.503***	-3.875***
	(0.331)	(0.548)	(0.485)	(0.958)	(0.385)	(0.892)
$MILLS_{it}$	0.410	0.511	0.244	0.295	1.283***	1.156
	(0.253)	(0.433)	(0.359)	(0.758)	(0.350)	(0.705)
$ABSACC_{it}$	-0.620	0.244	1.004	1.373	-1.674*	-0.818
	(0.718)	(0.783)	(1.016)	(1.369)	(0.960)	(1.275)
CAP_INT_{it}	0.005	0.003	-0.032**	-0.035	0.058***	0.081***
	(0.008)	(0.018)	(0.012)	(0.032)	(0.012)	(0.030)
Altman Z_{it}	0.147***	-0.067	0.119*	-0.060	0.221***	-0.173
	(0.050)	(0.125)	(0.070)	(0.219)	(0.062)	(0.204)
Constant	2.034	8.940**	5.094***	34.089***	-2.802	-19.739***
	(1.352)	(3.479)	(1.919)	(6.080)	(1.864)	(5.662)
N	32,013	32,013	32,013	32,013	32,013	32,013
R-squared	0.434	0.427	0.305	0.297	0.296	0.296
Time Effect	YES	YES	YES	YES	YES	YES
Industry Effect	YES	NO	YES	NO	YES	NO
Firm Fixed Effect	NO	YES	NO	YES	NO	YES
Adj. R-squared	0.432	0.388	0.303	0.249	0.295	0.249

Notes: This table presents the regression results of the percentage of change in the number of institutional investors (ΔII) on the cash flow forecast revision (ΔCPS) and other determinates of institutional trading. Standard errors presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1 are adjusted for firm level clustering, and are robust to heteroscedasticity and autocorrelation. See Table 4-1 for variable definitions.

4.6 Conclusions

As an increasing number of analysts now supplement their reports with cash flow forecasts, a growing amount of research has focussed on the quality and value of these cash flow forecasts to investors and whether or not cash flow forecasts allows for the better pricing of accruals (e.g., Mohanram, 2014, Radhakrishnan and Wu, 2014). At the same time, there is an ongoing debate concerning whether analysts' cash flows are sophisticated, or simply naïve extensions of their earnings forecasts (Givoly et al., 2009, Call et al., 2013). However, to date, no research has been undertaken that examines how investors react to cash flow forecasts (Mangen, 2013). I, therefore, investigated the response of institutional investors to this information by examining their trading behaviour to both the existence of, and revisions to, analysts' cash flow forecasts.

By examining institutional investors, I have contributed to the question of whether cash flow forecasts are incrementally useful for investors. As institutional investors are sophisticated (e.g., Battalio et al., 2012, Hendershott et al., 2015) they are more likely to be able to process any incremental information contained in the disclosure of cash flow forecasts. Put another way, if cash flow forecasts do not contain any useful informaton over and above earnings, target prices, and stock reccomendations, then there should be no relation with institutional trading.

The results show that the presence of cash flow forecasts tempers institutional investors' response to earnings revisions. This result holds only for short-term institutional investors. However, overall, the presence of cash flow forecasts reduces the amount of trading by institutions when earnings forecasts are revised compared to firms

where earnings are revised with no cash flow forecast. I have also found that institutional investors trade in the same direction as analysts' cash flow revisions, but this is only true for short-term institutional investors. Consequently, there is a significant increase/decrease in the number of short-run institutional investors' trading a stock depending on whether the cash flow revision was positive/negative. Overall, the presence of cash flow forecasts moderates institutional trading around earnings revisions, but revisions to cash flow forecasts only act as a trading signal for institutional investors with short-term investment horizons.

Other than cash flow forecasts, analysts' reports include target prices. Target price represents a direct investment signal with a concise horizon (Brav and Lehavy, 2003). Recently, Lin et al. (2016) have found that institutional investors respond to target prices. Yet, this response does not contribute to their profitability. However, this might not be the case for foreign institutional investors who face information disadvantage in the capital market (Baik et al., 2013). Consequently, foreign institutional investors should benefit from the information provided by analysts' target price revisions. Therefore, in Chapter 5, I examine the foreign institutional investors' response to the target price revision and the profitability of such behaviour.

5 When Analysts Talk Do Foreign Institutional Investors Listen?

5.1 Introduction

As a whole, while institutional investors respond to analysts' target price revisions, this trading behaviour does not yield any excess returns (Lin et al., 2016). This may be due to the fact that, when released, information provided by sell-side analysts is in the public domain and is, therefore, less profitable compared to trading on private information (Kacperczyk and Seru, 2007). However, institutional investors have varied access to private information, and particularly foreign institutional investors, who are commonly regarded as the least informed of all groups (Baik et al., 2013). Sell-side analysts' target price revisions could, therefore, provide an important source of information to help foreign institutional investors identify profitable trading opportunities in the U.S. equity market. However, whether and how foreign institutional investors respond to analysts' target price changes is unclear.

Foreign institutional investors are regarded as large and sophisticated money managers with the ability to process and respond to public information, such as analysts' forecasts, in a timely manner (e.g., Brennan et al., 2005, Ferreira et al., 2017, Kacperczyk et al., 2018). However, rather than collecting and processing public information on firms in foreign markets, foreign institutional investors have been shown to exhibit a home bias, and failed to act in a timely manner to information on their foreign holdings (e.g., Hau and Rey, 2008, Forbes, 2010, Baik et al., 2013). I, therefore, examine whether

foreign institutional investors respond to analysts' target prices and, if so, the profitability of such trading.

Using 51,427 firm-quarter observations between 2003 and 2013 in the U.S. equity market, I find that foreign institutional investors not only respond to analysts' target price revisions but generate significant excess returns when doing so. The results in this chapter are robust to controlling for other analysts' outputs, such as revisions to their earnings forecasts and stock recommendations, in addition to other determinants of institutional trading. These results are robust using different measures of institutional trading. The results in this chapter also show that foreign institutional trading based on target prices revisions is more pronounced in firms with high information asymmetry. The results show that foreign institutional investors rely more on analysts in small firms and firms with low analyst coverage. Taken together, the results in this chapter support the view that foreign institutions benefit from "listening" to sell-side analysts' who can help alleviate their relative information disadvantage when investing in foreign markets.

This chapter proceeds as follows. The next section discusses the relevant literature and develops the hypotheses. Section 5.3 describes the methodology while section 5.4 shows the descriptive statistics and section 5.5 outlines the results. Finally, Section 5.6 presents the conclusions.

5.2 Literature Review and Hypotheses Development

Most foreign investments are channelled through institutional investors (Abdioglu et al., 2013), who prefer geographically close, well-developed markets, with a common

language (Chan et al., 2005). While the literature agrees on the main determinants of foreign institutional ownership, the impact of such ownership remains highly debateable. On the one hand, foreign institutional ownership is associated with better and high quality financial reporting comparability (Fang et al., 2015, Beuselinck et al., 2017), long-term investment and innovation output (Bena et al., 2017) and more informative prices on the firm level (Kacperczyk et al., 2018). On the other hand, foreign institutional investors are geographically distant (Coval and Moskowitz, 1999), have cultural barriers (Kim et al., 2016) and are home-biased (Kang and Stulz 1997).

One of the main reasons behind the presence of the home-bias phenomenon is the information asymmetry gap between foreign and domestic investors (Kalev et al., 2008). While overall institutional investors are more informed than other investors in the capital market (Hendershott et al., 2015), foreign institutional investors are at an information disadvantage compared with their domestic peers (Kang and Kim, 2010).

Therefore, foreign institutional investors have always been interested in firms with high quality of corporate disclosure (Aggarwal et al., 2005, Gelos and Wei, 2005, Covrig et al., 2007). Foreign institutional investors also prefer large, liquid firms with low information asymmetry (Baik et al., 2013, Abdioglu et al., 2015) and firms with higher levels of governance (Aggarwal et al., 2011), a large number of foreign operations (Cai and Warnock, 2012), and high analyst coverage stocks (Ferreira and Matos, 2008, Kacperczyk et al., 2018).

Similarly, foreign institutional investors prefer investing in the U.S. due to the development of their financial system (Forbes, 2010), in large, liquid firms that are

followed by higher numbers of analysts. Yet, they generate lower future return compared with their domestic peers (Baik et al., 2013). This can be explained by the poor stock picking abilities to foreign institutional investors. However, whether and how analysts' forecasts help foreign institutional investors to mitigate their information disadvantage remains largely unexplored.

As a group, institutional investors rely on analysts' earnings' forecasts (Walther, 1997), trade based on information contained in target prices (Lin et al., 2016), and generate excess returns when trading on analysts' stock recommendations (Chen and Cheng, 2006, Green, 2006, Irvine et al., 2007). However, when considering their size, large sophisticated institutional investors appear to be more aware of the inherent bias and conflicts in analysts' recommendations, compared to small investors who naively follow the analysts' advice (Malmendier and Shanthikumar, 2007, Mikhail et al., 2007, Malmendier and Shanthikumar, 2014). Consequently, small investors generate significantly lower abnormal returns, compared to large investors who, being aware of the analysts' biased recommendations, place comparatively more weight on the analysts' earnings forecasts (Malmendier and Shanthikumar, 2014).

With the exception of these studies examining the differential effects of the investors' size, institutional investors are generally regarded as a homogenous user of analysts' outputs. However, foreign institutional investors differ significantly in both their demand for, and ability to acquire, information on their foreign shareholdings. Compared to domestic institutional investors, foreign institutional investors are more sensitive to public information (Brennan et al., 2005), and their trading behaviour differs according to the level of analyst coverage (Ferreira et al., 2017). Thus, a high analyst

presence appears to be a valuable source of information to foreign institutional investors who are unfamiliar with the host-country capital market (Baik et al., 2013). However, foreign institutional investors may be home-biased and less inclined to gather and process information about fundamentals in foreign markets. To date, whether foreign institutional investors would benefit from trading based on analysts' forecasts remains largely unexplored.

Analysts' reports include mainly stock recommendations, earnings forecasts and target price. Analysts target price contains distinct information, to which investors react, even in the presence of stock recommendation and earnings forecasts (Asquith et al., 2005). Analysts explicitly express their opinions when setting target prices (Huang et al., 2009) and they revise it more frequently than stock recommendations (Lin et al., 2016). In contrast with stock recommendations and earnings forecasts, target prices are a verifiable signal that can easily be compared among analysts (Gleason et al., 2013).

Overall, institutional investors respond to target price revisions. Yet, this trading behaviour is not associated with any future returns (Lin et al., 2016). This might be explained by the proposition that fund managers who trade based on public information such as analysts' recommendations underperform their peers who trade based on private information (Kacperczyk and Seru, 2007). Yet, not all types of institutional investors have access to the private information. In particular, foreign institutional investors have limited access to the private information. Therefore, they might benefit from analysts' target price revisions. Thus, this chapter tests the following hypothesis:

H1: *foreign institutional investors trade in the same direction as analyst target prices revisions*

Lastly and more importantly, I aim to shed light on the profitability of foreign institutional investors' trading based on target prices revisions. While Lin et al. (2016) fail to find evidence that overall institutional investors' reliance on target prices is associated with any future abnormal returns, this may be due to the lack of profitability of the public information compared to the private information to sophisticated money managers (Kacperczyk and Seru, 2007). Yet, neither Lin et al. (2016), nor the above mentioned papers shed light on the profitability of analysts' forecasts for less informed institutional investors such as foreign institutional investors.

Foreign institutional investors act as less informed than their domestic peers (Ferreira et al., 2017). In the U.S., foreign institutional investors have poor stock picking ability which leads to significant negative future return (Baik et al., 2013). Thus, I propose that foreign institutional investors trading based on the analysts' target price revisions will improve foreign institutional investors' abilities to pick profitable stocks and, therefore, alleviate their information disadvantage in the capital market.

This proposition is also motivated by the debate surrounding the profitability of public information. On the one hand, institutional investors trading based on analysts' stock recommendations lead to excess returns (Chen and Cheng, 2006, Green, 2006, Irvine et al., 2007). On the other hand, reliance on publicly available information such as analysts' stock recommendations signals low managerial abilities (Kacperczyk and Seru, 2007). Therefore, it is crucial to investigate the impact of following analysts' forecasts on a unique type of institutional investors' profitability. Therefore, this chapter aims to test the following hypothesis:

H2: *foreign institutional investors' reaction to target price revisions will contribute positively to their future returns*

5.3 Methodology

5.3.1 Institutional Investors Trading

Various measures were used to proxy institutional trading in the prior literature. The key difference between these measures is the choice between the number of institutions and the number of shares they hold (Edelen et al., 2016). This chapter uses various measures to proxy institutional trading, as explained below.

I start by the most conventional measure in the literature, the changes in the percentage of institutional ownership. I follow Chen and Cheng (2006), Jiang (2010) and Lin et al. (2016), among others, and construct the first trading measure as follows:

$$\Delta IO\text{-}For_{it} = (IO_{it} - IO_{it-1}) \times 100 \quad (5.1)$$

Where

IO_{it}: is the number of shares held by foreign institutional investors at the end of the quarter scaled by the number of shares outstanding at the end of the quarter.

Yet, DeVault et al. (2018) note that - for many firms - the percentage of shares held by institutional investors might decline due to events which affect only the number of shares outstanding such as an employee stock option during the quarter. This type of event affects the percentage of institutional ownership without any real institutional

trading. Thus, to overcome this issue, I adopt the measure proposed by DeVault et al. (2018) and calculate an alternative measure of foreign institutional trading as follows:

$$\Delta\text{INS-FOR}_{it} = \frac{\text{INST}_{it}\text{-INST}_{it-1}}{\#\text{Shares-Outstanding}_{it}} \times 100 \quad (5.2)$$

Where

INST_{it}: the number of shares held by foreign institutional investors at the end of the current quarter.

$\#\text{Shares-Outstanding}_{it}$: the number of shares outstanding at the end of the current quarter.

However, Guo and Qiu (2016) propose that using changes in the number of institutional investors is a better measure of informed trading for several reasons. First, institutional investors are heterogeneous regarding their informativeness. Thus, more informed institutional investors buy and sell to less informed institutional investors, a behaviour which cannot be captured using the changes in the overall number of shares owned. However, both types of transaction are captured by the changes in the number of institutions.[20] Second, substantial changes in the institutional ownership have a significant influence on the stock price and are easily observed by other investors in the market. However, the exit and entry decisions will only be observed by other investors on the date the 13F is filed. In addition, Edelen et al. (2016) argue that this measure

[20] Guo and Qiu (2016) specifically argue that more informed institutions will buy from less informed institutions. Yet, less informed institutions are highly unlikely to liquidate their positions entirely. In such cases, changes in number of institutions can capture what changes in the shares held cannot.

provides an "equal-weighted account" to each manager, and overcomes the problems of the demands of a few large institutions. Furthermore, Edelen et al. (2016) argue that changes in the number of shares held by institutional investors might be due to portfolio rebalancing and ongoing adjustment in the positions which represent trade without information, while there is a high probability that the entry and exit decisions are related to the presence of new information.

Thus, I will use the percentage of change in the number of foreign institutional investors as an additional proxy for their response to the target price revisions. This measure of institutional trading studies the wide institutional response (e.g., whether new managers are buying or selling based on the analysts' outputs) by examining changes in the number of institutional investment managers in two subsequent quarters. Following Guo and Qiu (2016), the percentage change in the number of institutional managers holding a stock (ΔMAN_{it}) is calculated as follows:

$$\Delta \text{II-FOR}_{it} = \frac{\text{II}_{it} - \text{II}_{it-1}}{\text{II}_{it-1}} \times 100 \quad (5.3)$$

Where

II_{it}: is the number of foreign institutional investors who hold the stock at the end of the current quarter.

5.3.2 The Model

Prior studies have documented a positive association between overall institutional trading and earnings revisions, stock recommendations, and target prices (Chen and

Cheng, 2006, Lin et al., 2016). In addition, research has found that analysts' coverage is positively associated with the levels of foreign institutional trading (Ferreira et al., 2017). This chapter contributes to both strands of literature by directly examining the usefulness of analysts' forecasts to foreign institutional investors. Therefore, to test the first hypothesis, I extend the methodology of Chen and Cheng (2006) and Lin et al. (2016) to examine the foreign institutional investors trading based on target price revisions as follows:

$$\begin{aligned} TRADING = {} & \beta_0 + \beta_1 \Delta TP + \beta_2 \Delta EPS + \beta_3 \Delta REC + \beta_4 \Delta TURN + \beta_5 \Delta DIV \\ & + \beta_6 LOG(MV) + \beta_7 PB + \beta_8 MRET_{it-2,it} + \beta_9 MRET_{it-4,it-2} + \beta_{10} \Delta VOL \\ & + \beta_{11} \Delta BETA + \beta_{12} SPindex + \beta_{13} Time + \beta_{14} Industry + \varepsilon \end{aligned} \quad (5.4)$$

Where TRADING: is either ΔIO-FOR or ΔINST-FOR or ΔII-FOR for institutional investors as explained in equations 5.1, 5.2 and 5.3. ΔTP is the quarterly percentage change in the target prices (TP). TP is the target prices at the end of the current quarter. Analysts' target prices at the end of the quarter is the average of all analysts' target prices at the end of the quarter.

In this chapter, I control for several variables that are shown in the extant literature to influence institutional trading. First, following Chen and Cheng (2006), I control for changes in stock recommendations (ΔREC), which are shown to be associated with institutional trading. I also control for analysts' earnings forecasts' revisions (ΔEPS) which are shown to impact institutional trading positively. Next, following Gompers and Metrick (2001), I also control for the quarterly changes in share turnover ratio (ΔTURN), dividends (ΔDIV), and the natural logarithm of market value LOG(MV), which proxy

for institutional investors' preference towards liquid, prudent, and profitable stocks, which I expect to be positively associated with institutional trading.

While institutional investors may buy stocks with a high book to market ratio (Gompers and Metrick, 2001), they may, instead, prefer glamour stocks (Sharma et al., 2008, Chen and Cheng, 2006). I, therefore, include a control for the book-to-price ratio (BP) but do not predict the direction of association with institutional trading. Institutional investors are expected to be positive feedback traders who buy the past winners and sell the past losers. Momentum trading is captured using market adjusted cumulative return in the prior two quarters ($MRET_{it-2, it}$) as well as the adjusted cumulative return in the six months before the quarter t-2 ($MRET_{it-4, it-2}$). Thus, $MRET_{it-2, it}$ and $MRET_{it-4, it-2}$ are expected to be positively associated with institutional investors trading. Then, following Bennett et al. (2003), I control for institutional investors' appetite for risk by including the quarterly changes in beta (ΔBETA) and a firm specific volatility (ΔVOL). I predict a negative association between institutional trading and ΔBETA, but a positive association between institutional trading and ΔVOL. Lastly, I also control for adding and dropping from the Standard and Poor index as the institutional investors should act as prudent investors (Gompers and Metrick, 2001). Thus, they are expected to trade in the firms following the index changes. Calculation of the control variables can be found in Table 5-1, below.

Table 5-1: Variables Definitions

Variable	Definition
IO_Ttl	= The number of shares held by all institutional investors divided by the number of shares outstanding at the end of the current quarter
IO_Dom	= The number of shares held by domestic institutional investors divided by the number of shares outstanding at the end of the current quarter
IO_For	= The number of shares held by foreign institutional investors divided by the number of shares outstanding at the end of the current quarter
ΔIO_Ttl	= The quarterly change in the total institutional ownership (II_Ttl)
ΔIO_Dom	= The quarterly change in the total domestic institutional ownership (II_Dom)
ΔIO_For	= The quarterly change in the total foreign institutional ownership (II_For)
II_Ttl	= The number of all institutional investors in the firm in the current quarter
II_Dom	= The number of domestic institutional investors in the firm in the current quarter
II_For	= The number of foreign institutional investors in the firm in the current quarter
ΔII_Ttl	= The quarterly percentage change in the number of institutional investors (II_Ttl)
ΔII_Dom	= The quarterly percentage change in the number of domestic institutional investors
ΔII_For	= The quarterly percentage change in the number of foreign institutional investors (II_For)
TP	= The most recent consensus target price in the current quarter.
ΔTP	= The quarterly percentage change in TP.
EPS	= The most recent annual consensus earnings forecasts in the current quarter.
ΔEPS	= The quarterly change in EPS scaled by the stock price at the end of the current quarter
REC	= The analysts' consensus stock recommendation in quarter t, whereby recommendations are scaled as follows: 5. Strong Buy, 4. Buy, 3. Hold, 2, Sell and 1. Strong Sell.
ΔREC	= A dummy variable that equals one if consensus analysts upgrade their recommendations and zero otherwise.
TURN	= The average of the monthly turnover ratio over the past six months preceding quarter t, whereby the monthly turnover ratio is calculated as the monthly trading volume divided by the number of shares outstanding at the end of the month
ΔTURN	= The quarterly change in TURN
DIV	= Cash dividend during quarter t divided by the stock price at the end of the current quarter
ΔDIV	= The quarterly change in DIV
MV	= The market value of equity calculated as the number of shares outstanding at the end of the current quarter multiplied by the price at the end of the current quarter
LOG (MV)	= The natural logarithm of MV
PB	= The market value at the end of the current quarter divided by the book value of common equity at the end of the current quarter
$MRET_{t-2,t}$	= Market-adjusted cumulative monthly stock return over the preceding 6 months of the current quarter
$MRET_{t-4,t-2}$	= Market-adjusted cumulative monthly stock return over the preceding 7 to 12 months of the current quarter
VOL	= Volatility calculated as the standard deviation of the monthly stock returns of firm i in the six months preceding the current quarter.
ΔVOL	= The quarterly change in VOL
BETA	= Beta is calculated as the coefficients of a regression of the monthly return of the firm on the value-weighted index return over the 36 months prior to the end of quarter.
ΔBETA	= The quarterly change in BETA.
SPindex	= A dummy variable which takes a value 1 if the stock was added to the Standard and Poor index, −1 if it was dropped from the same index, zero otherwise.
Dum_TP	= An indicator variable that equals one if the value of Target price revisions is equal to or greater than zero and zero otherwise.
Analysts' Coverage	= The number of analysts issued earnings forecast from I/B/E/S summary file at the end of the current quarter.
$Size_{Dummy}$	= An indicator variable that equals one if the value of LOG(MV) is greater than the median of LOG (MV) in particular year and zero otherwise.
$Analyst_{Dummy}$	= An indicator variable that equals one if the Analysts' Coverage is greater than the median of Analysts' coverage in particular year and zero otherwise.

5.3.3 Data and Sample Selection

I start by collecting analysts' annual earnings forecasts, annual cash flow forecasts, stock recommendations, and target prices for all U.S. companies from I/B/E/S from the second quarter of 2003 to the fourth quarter of 2013.[21] I then remove all observations with insufficient information to calculate quarterly revisions in earnings forecasts, stock recommendations, or target prices, and restrict the sample to firms with non-missing share prices from CRSP, traded on NYSE, AMEX, and NASDAQ, and with share codes 10 and 11. This provides an initial sample of 124,025 firm-quarter observations as show in Table 5-2. From this initial sample, I exclude 20,966 firm quarter observations in the financial services industry and 11,191 firm quarter observations in utility industry.

Next, I remove 8,446 firm-quarters with insufficient data on Thomson-Reuters 13F institutional holding database required to calculate the main institutional trading variables. In addition, for this chapter, I also remove 3,067 firm-quarter observations with missing foreign institutional holding data. Since, in this chapter, I am interested in the foreign institutional investors trading, I restrict the sample to firm-quarter observations which have the data required to calculate the foreign institutional trading variables.

[21] I start the sample period in the second quarter of 2003 to avoid any confounding effects of significant regulatory changes leading up to this date from Regulation FD and the Global Research Analyst Settlement agreement. With the approval of Rule 2711 and NYSE Rule 472, these changes aimed to increase the objectivity of analysts, restore confidence in the capital market, and protect investors.

In addition, for this chapter, I require the firm to be followed by at least three analysts.[22] Therefore, I exclude 14,778 firm quarter observations. Finally, I exclude observations missing the required data needed to calculate the control variables from CRSP and COMPUSTAT. The final sample, therefore, consists of 2,834 unique firms with 51,427 firm-quarter observations as shown in Table 5-2. I winsorize all continuous variables at the 1% and 99% level to minimise the effect of outliers.

Table 5-2: Sample selection

	Firm - quarters observations
Initial sample from I/B/E/S from 2003 to 2013	124,025
Less: financial and utility firms	(32,175)
Less: firms missing institutional holding information from 13F	(8,446)
Less: firms missing foreign institutional trading information from 13F	(3,067)
Less: firms with less than three analysts' following	(14,778)
Less: firms missing information to calculate the controlling variables from CRSP and COMPUSTAT	(14,132)
Final Sample	51,427

Notes: This table shows the sample selection process followed to arrive at the final sample of 51,427 U.S. firm-quarters between the second quarter of 2003 and the fourth quarter of 2013.

5.4 Descriptive Statistics

Descriptive statistics for the key variables are reported in Table 5-3 and show that institutional investors hold 72.5% of the shares (IO_Ttl) for the average firm-quarter, represented by 214 institutional investors (II_Ttl). Splitting institutional investors according to their geographic presence shows that the majority of institutional investors in the U.S. are domestic. Specifically, on average, foreign/(domestic) institutional

[22] I use the I/B/E/S earnings forecast summary file at the end of the quarter to determine the number of analysts following the firm.

investors hold 5.1% (67.3%) of a firm's shares in a given quarter, represented by 21/(193) institutional investors.

Statistics for analysts' outputs the average firm issue target price of $33.3, earnings forecast of $1.4, and consensus stock recommendation of 3.62 (REC). An analysis of the quarterly change in these outputs over the sample period shows that while analysts appear to raise their average target prices, they lower their earnings forecasts.

The descriptive statistics for control variables show that the sample has a small number of large firms as shown by an average/(median) market capitalisation of $6.314 billion/($1.251 billion) at the end of the quarter. Further, the average firm reports a market to book ratio of 3.28, a dividend yield of 0.2%, and cumulative market adjusted return in the prior six months of 5.11%. The measure of share turnover (TURN) shows, on average, 22.5% of a firm's shares were traded over each quarter. For the measures of risk, average volatility (VOL_{it}) in each quarter is 11.1% and the average beta (BETA) is 1.43.

Table 5-3: Pooled descriptive statistics

Variable	p25	Mean	sd	p50	p75
IO_Ttl	18.4%	72.5%	17.9%	76.5%	98.5%
IO_Dom	16.4%	67.3%	17.1%	70.6%	94.0%
IO_For	0.1%	5.1%	3.5%	4.7%	16.8%
ΔIO_Ttl	-2.21	0.136	4.96	0.171	2.61
ΔIO_Dom	-2.23	0.11	4.79	0.117	2.57
ΔIO_For	-0.476	0.016	1.61	0.047	0.644
ΔINST_Ttl	-2.15	0.356	5.18	0.236	2.77
ΔINST_Dom	-2.14	0.32	4.98	0.183	2.73
ΔINST_For	-0.466	0.028	1.61	0.053	0.652
II_Ttl	93	214	206	143	252
II_Dom	87	193	187	132	222
II_For	6	21	22.8	11	28
ΔII_Ttl	-4.35	1.42	9.47	0.844	6.32
ΔII_Dom	-4.61	1.27	9.59	0.575	6.2
ΔII_For	-8.33	6.08	27.4	0	16.7
TP	14.2	33.3	29.2	25.3	42.6
ΔTP	-0.050	0.029	0.165	0.024	0.105
REC	3	3.62	0.677	3.6	4
ΔREC	0	0.609	0.488	1	1
EPS	0.377	1.4	1.85	1.09	2.13
ΔEPS	-0.003	-0.002	0.035	0.000	0.005
TURN	0.118	0.225	0.159	0.181	0.279
ΔTURN	-0.022	-0.001	0.052	-0.001	0.02
DIV	0	0.002	0.003	0	0.003
ΔDIV	0	0	0.002	0	0
MV (in millions)	438	6314	16834	1251	4,050
LOG (MV)	6.08	7.29	1.61	7.13	8.31
PB	1.57	3.28	2.96	2.43	3.82
$MRET_{it-2, it}$	-0.121	0.051	0.288	0.021	0.177
$MRET_{it-4,it-2}$	-0.122	0.059	0.303	0.025	0.187
VOL	0.065	0.111	0.064	0.096	0.14
ΔVOL	-0.024	-0.003	0.045	-0.002	0.02
BETA	0.834	1.43	0.864	1.29	1.86
ΔBETA	-0.102	-0.001	0.258	0.003	0.108
SPindex	0	0.006	0.189	0	0

Notes: This table summarises the main sample statistics of key variables for the 51,724 firm-quarter observations in the sample of listed U.S. companies between the second quarter of 2003 and the fourth quarter of 2013. See Table 5-1 for variable definitions.

5.5 Empirical Results

5.5.1 Institutional Investors' Trading Based on Target Price Revisions

Table 5-4 presents regression estimates for Equation 5.4. I proxy foreign institutional trading using three different measures. Column 1 of Table 5-4 uses the quarterly change in the percentage of foreign institutional ownership (ΔIO_For). Column 2 of Table 5-4 uses the quarterly change in the number of shares held by foreign institutional investors scaled by the number of shares outstanding at the end of the quarter (ΔINST_For) while column 3 of Table 5-4 uses the percentage change in the number of foreign institutional investors as the dependent variable. All of the regressions include industry fixed effects using the 49 Fama-French classification in addition to time fixed effect.

I find that the coefficient of (ΔTP) is positive and significant at 1% levels across all regressions, consistent with the predictions in the first hypothesis. Foreign institutional investors trade based on analysts' target prices even after controlling for analysts' earnings revisions and stock recommendations. This trading is economically meaningful, as an increase in one standard deviation of target prices boosts foreign institutional trading by 0.32%. As a comparison, a one standard deviation increase of earnings' forecasts revisions (ΔEPS), and adjusted market return ($MRET_{it-2, it}$) will boost foreign institutional trading by 0.015% and 0.075%, respectively.

The results also show that foreign institutional investors' trade based on analysts' earnings forecasts revisions. Yet, I fail to find evidence that foreign institutional investors

respond to the recommendations revisions as evidenced by Chen and Cheng (2006) who document that, overall, institutional investors respond to sell-side analysts' recommendations. However, the results are consistent with Malmendier and Shanthikumar (2014) who argue that institutional investors do not trade based on the analysts' recommendations. The results for control variables are consistent with prior studies and with the predictions in the methodology section. Specifically, I find that foreign institutional investors are momentum traders who buy the past winners and sell the past losers evidenced by the significant coefficients of the two momentum variables $MRET_{it-2,it}$ and $MRET_{it-4,it-2}$. I also confirm that foreign institutional investors prefer liquid firms.

Yet, the prior analyses do not show how foreign institutional investors benefit from the analyses. In section 5.5.2, I will test whether foreign institutional investors trading based on analysts' target prices will help them to alleviate their information disadvantage and generate future abnormal return.

Table 5-4: Regression of foreign institutional trading on analysts' revisions

VARIABLES	ΔIO_For (1)	ΔINST_For (2)	ΔII_For (3)
ΔTP	0.191***	0.228***	24.264***
	(0.040)	(0.040)	(0.818)
ΔEPS	0.422***	0.428***	18.900***
	(0.163)	(0.163)	(3.348)
ΔREC	-0.040***	-0.037***	-0.126
	(0.011)	(0.011)	(0.233)
ΔTURN	0.317***	0.393***	6.238***
	(0.113)	(0.113)	(2.319)
ΔDIV	-2.710	-3.249	69.851
	(3.324)	(3.317)	(68.169)
LOG(MV)	0.017***	0.007**	-1.095***
	(0.004)	(0.004)	(0.074)
PB	0.002	0.001	0.156***
	(0.002)	(0.002)	(0.042)
$MRET_{it-2, it}$	0.259***	0.297***	7.668***
	(0.021)	(0.021)	(0.437)
$MRET_{it-4,it-2}$	0.052***	0.068***	2.028***
	(0.019)	(0.019)	(0.386)
ΔVOL	0.076	0.087	0.234
	(0.129)	(0.129)	(2.651)
ΔBETA	0.015	0.017	-0.527
	(0.021)	(0.021)	(0.438)
SPindex	0.032	0.045	1.646***
	(0.029)	(0.029)	(0.603)
Constant	0.310*	0.391**	14.735***
	(0.159)	(0.158)	(3.252)
Observations	51,427	51,427	51,427
Time Effect	YES	YES	YES
Industry Effect	YES	YES	YES
R-squared	0.422	0.420	0.160
Adj. R-squared	0.421	0.419	0.159

Notes: This table presents the regression results of the three proxies of foreign trading change in the percentage of institutional ownership (ΔIO_For), changes in the number of shares held by foreign institutional investors (ΔINST_For) and quarterly percentage of changes in the number of foreign institutional investors (ΔII_For) on the analysts' target price revisions (ΔTP), and other determinates of institutional trading. Standard errors are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are adjusted for firm-level clustering and are robust to heteroscedasticity and autocorrelation. See Table 5-1 for variable definitions.

5.5.2 Future Returns, Foreign Institutional Trading and Analysts' Revisions

To examine whether foreign institutional investors benefit from trading based on target prices revisions, I adopt the methodology of Gompers and Metrick (2001) and examine the association between the future returns in the subsequent quarter and the changes in institutional ownership as an indicator of the return predictability of institutional trading. Then I follow the methodology of Brown et al. (2014), and interact the analysts target price revisions with foreign institutional trading to capture the impact of foreign institutional trading explained by target price revisions on the future stock return.[23] I also modify Gompers and Metrick (2001) by using the measure of DeVault et al. (2018) for institutional trading in addition to the Guo and Qiu (2016) measure.

In columns 1, 2 and 3 of Table 5-5, I use the cumulative market-adjusted return in the subsequent quarter as the dependent variable, while in columns 4, 5 and 6 of Table 5-5, I use the cumulative market-adjusted stock return in the subsequent year as the dependent variables. The results show that target price revisions are positively associated with market-adjusted return in the subsequent quarter while foreign institutional investors trading is negatively and significantly associated with the future returns in the subsequent quarter.

The negative coefficient of changes in institutional ownership can be explained by their poor ability to predict the future return due to the information disadvantage they

[23] To ease the interpretation, I transform the analysts' target price revisions (ΔTP) to an indicator variable that equals one if the analysts upgrade or did not change their forecasts and zero otherwise. The results remain similar if I use analysts target prices revisions as a continuous variable

face as foreigners (Baik et al., 2013). While the link between foreign institutional investors' trading and subsequent return have been shown by Baik et al. (2013), I aim to test whether the negative association can be alleviated by responding to analysts' target prices revisions. Thus, in Table 5-5, I introduce the interaction term between foreign institutional trading and target price revisions indicator variable which is supposed to capture the incremental contribution of target price revisions on foreign institutional investors trading.

The positive sign of the coefficients of the interaction term suggesting that the institutional trading is explained by the target prices revisions decrease the negative relationship between foreign institutional trading and subsequent future return. The results are consistent using the three proxies of institutional trading. The positive sign of the coefficients of the interaction term support the prediction in the second hypothesis that foreign institutional investors' response to the analysts' target price revisions contribute positively to foreign institutional investors' profitability.

Following Yan and Zhang (2009), I also use the market-adjusted return in the subsequent year to check whether the impact of such trading lasts for a year. The result for the interaction term remains positive but insignificant at the 5% level. This might be explained by the short-term value of analysts' forecasts in general.

Table 5-5: Regression of future returns on foreign institutional trading and analysts' revisions

VARIABLES	Adj-Ret $_{t:t+1}$			Adj-Ret $_{t:t+4}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Dum_TP	1.734***	1.735***	1.691***	0.057***	0.058***	0.054***
	(0.186)	(0.186)	(0.190)	(0.004)	(0.004)	(0.004)
ΔIO_For	-0.353***			-0.007***		
	(0.104)			(0.002)		
ΔIO_For×Dum_TP	0.292***			0.000		
	(0.113)			(0.002)		
ΔINST_For		-0.380***			-0.008***	
		(0.105)			(0.002)	
ΔINST_For×Dum_TP		0.286**			0.001	
		(0.113)			(0.002)	
ΔII_For			-0.012*			-0.001***
			(0.006)			(0.000)
ΔII_For×ΔTP			0.016**			0.001***
			(0.007)			(0.000)
IO_For$_{it-1}$	-6.629**	-6.916**		-0.138	-0.141	
	(3.120)	(3.133)		(0.118)	(0.119)	
II_For$_{it-1}$			0.006			-0.001***
			(0.007)			(0.000)
TURN	-0.463	-0.439	-0.730	-0.056**	-0.055**	-0.060**
	(0.697)	(0.697)	(0.686)	(0.024)	(0.024)	(0.024)
DIV	45.875*	45.453*	44.082	0.334	0.322	0.649
	(27.601)	(27.595)	(27.766)	(0.965)	(0.966)	(0.967)
LOG(MV)	-0.225***	-0.225***	-0.355***	-0.005**	-0.005**	0.004
	(0.062)	(0.062)	(0.114)	(0.002)	(0.002)	(0.004)
PB	-0.031	-0.031	-0.026	0.003**	0.002**	0.002**
	(0.034)	(0.034)	(0.034)	(0.001)	(0.001)	(0.001)
MRET$_{it-2,it}$	-2.169***	-2.156***	-2.155***	-0.090***	-0.090***	-0.094***
	(0.378)	(0.379)	(0.378)	(0.009)	(0.009)	(0.009)
MRET$_{it-4,it-2}$	-1.443***	-1.441***	-1.411***	-0.046***	-0.046***	-0.048***
	(0.334)	(0.334)	(0.334)	(0.009)	(0.009)	(0.009)
SPindex	-0.636*	-0.634*	-0.640*	-0.005	-0.005	-0.005
	(0.335)	(0.334)	(0.335)	(0.006)	(0.006)	(0.006)
Constant	7.654***	7.687***	7.998***	0.141***	0.142***	0.072
	(1.367)	(1.367)	(1.539)	(0.038)	(0.038)	(0.044)
Observations	51,427	51,427	51,427	51,427	51,427	51,427
Time Effect	YES	YES	YES	YES	YES	YES
Industry Effect	YES	YES	YES	YES	YES	YES
R-squared	0.060	0.060	0.060	0.064	0.064	0.064
Adj. R-squared	0.0582	0.0582	0.0580	0.0620	0.0621	0.0626

Notes: This table presents the regression results of one quarter ahead and one year ahead market-adjusted return on foreign institutional trading, prior quarter analysts' outputs, interaction between foreign institutional trading and prior quarter target price indicator variable and other control variables. Standard errors are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are adjusted for firm-level clustering and are robust to heteroscedasticity and autocorrelation. See Table 5-1 for variable definitions

In an unreported test, I examine the price impact over a longer horizon to test whether foreign institutional investors trading based on analysts' target price revisions cause return reversals. I fail to find any evidence of reversals over the four quarters or eight quarters following the period covered in Table 5-5.

5.5.3 Further Analyses

In this section, I follow Brown et al. (2014) and Lin et al. (2016), and use the prior quarter target prices and other analysts' forecasts to ensure that I am not simply capturing simultaneous changes in analysts' forecasts and institutional trading. This methodology also ensures that foreign institutional investors have sufficient time to respond to the information. Therefore, in Tables 5-6 and 5-7, I repeat the initial analyses in Table 5-4 and Table 5-5 using the prior quarter analysts' forecasts. The results remain qualitatively similar. Specifically, in Table 5-6, the coefficient of (ΔTP_{it-1}) remains positive and significant at 5% levels across all regressions. In Table 5-7, the interaction term between the foreign institutional trading and prior target price is positive and marginally significant at 10%. Overall, the prior results confirmed that the foreign institutional investors respond to target prices revisions.

Table 5-6: Regression of foreign institutional trading on lagged analysts' forecasts revisions

VARIABLES	ΔIO_For (1)	ΔINST_For (2)	ΔII_For (3)
ΔTP_{it_1}	0.084*	0.107**	4.556***
	(0.049)	(0.048)	(1.006)
ΔEPS_{it_1}	0.550***	0.400**	0.465
	(0.161)	(0.161)	(3.343)
ΔREC_{it_1}	-0.017	-0.014	0.102
	(0.011)	(0.011)	(0.235)
ΔTURN	0.307***	0.381***	4.661**
	(0.113)	(0.113)	(2.341)
ΔDIV	-3.788	-4.451	-44.931
	(3.321)	(3.315)	(68.753)
LOG(MV)	0.018***	0.009**	-0.954***
	(0.004)	(0.004)	(0.075)
PB	0.003	0.003	0.289***
	(0.002)	(0.002)	(0.042)
$MRET_{it-2,\ it}$	0.254***	0.293***	10.221***
	(0.027)	(0.027)	(0.554)
$MRET_{it-4,it-2}$	0.043**	0.059***	1.727***
	(0.019)	(0.019)	(0.394)
ΔVOL	0.089	0.099	1.611
	(0.129)	(0.129)	(2.678)
ΔBETA	0.015	0.015	-0.657
	(0.021)	(0.021)	(0.442)
SPindex	0.033	0.046	1.754***
	(0.029)	(0.029)	(0.609)
Constant	0.295*	0.377**	14.650***
	(0.159)	(0.158)	(3.286)
Observations	51,427	51,427	51,427
Time Effect	YES	YES	YES
Industry Effect	YES	YES	YES
R-squared	0.422	0.420	0.144
Adj. R-squared	0.421	0.419	0.142

Notes: This table presents the regression results of the three proxies of foreign trading change in the percentage of institutional ownership (ΔIO_For), changes in the number of shares held by foreign institutional investors (ΔINST_For) and quarterly percentage of changes in the number of foreign institutional investors (ΔII_For) on the prior quarter analysts target price revisions (ΔTP), and other determinates of institutional trading. Standard errors are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are adjusted for firm-level clustering and are robust to heteroscedasticity and autocorrelation. See Table 5-1 for variable definitions

Table 5-7: Regressions of future returns on foreign institutional trading and lagged analysts' revisions

VARIABLES	Adj-Ret $_{t:t+1}$			Adj-Ret $_{t:t+4}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Dum_TP_{t-1}	0.913***	0.916***	0.833***	0.029***	0.029***	0.027***
	(0.202)	(0.202)	(0.205)	(0.004)	(0.004)	(0.005)
ΔIO_For	-0.293***			-0.006***		
	(0.105)			(0.002)		
$\Delta IO\_For \times Dum\_TP_{t-1}$	0.197*			-0.002		
	(0.115)			(0.003)		
ΔINST_For		-0.314***			-0.007***	
		(0.106)			(0.002)	
$\Delta INST\_For \times Dum\_TP_{t-1}$		0.183			-0.001	
		(0.115)			(0.003)	
ΔII_For			-0.009			-0.000***
			(0.006)			(0.000)
$\Delta II\_For \times Dum\_TP_{t-1}$			0.016**			0.000*
			(0.007)			(0.000)
IO_For_{it-1}			0.001			-0.001***
			(0.007)			(0.000)
II_For_{it-1}	-7.374**	-7.633**		-0.158	-0.160	
	(3.161)	(3.173)		(0.120)	(0.120)	
TURN	-0.711	-0.686	-0.962	-0.064***	-0.064***	-0.068***
	(0.705)	(0.705)	(0.695)	(0.025)	(0.025)	(0.024)
DIV	34.802	34.404	34.435	-0.039	-0.051	0.339
	(27.768)	(27.764)	(27.952)	(0.972)	(0.972)	(0.973)
LOG(MV)	-0.192***	-0.191***	-0.267**	-0.004*	-0.004*	0.006
	(0.062)	(0.062)	(0.115)	(0.002)	(0.002)	(0.004)
PB	-0.013	-0.013	-0.010	0.003**	0.003**	0.003**
	(0.034)	(0.034)	(0.034)	(0.001)	(0.001)	(0.001)
$MRET_{it-2,it}$	-2.212***	-2.202***	-2.243***	-0.090***	-0.090***	-0.095***
	(0.412)	(0.412)	(0.412)	(0.010)	(0.010)	(0.010)
$MRET_{it-4,it-2}$	-1.531***	-1.529***	-1.514***	-0.048***	-0.048***	-0.051***
	(0.338)	(0.338)	(0.338)	(0.009)	(0.009)	(0.009)
SPindex	-0.607*	-0.604*	-0.621*	-0.005	-0.005	-0.004
	(0.336)	(0.336)	(0.335)	(0.006)	(0.006)	(0.006)
Constant	8.315***	8.345***	8.296***	0.164***	0.164***	0.081*
	(1.386)	(1.386)	(1.552)	(0.038)	(0.038)	(0.044)
Observations	51,427	51,427	51,427	51,427	51,427	51,427
Time Effect	YES	YES	YES	YES	YES	YES
Industry Effect	YES	YES	YES	YES	YES	YES
R-squared	0.059	0.059	0.058	0.061	0.061	0.061
Adj. R-squared	0.0569	0.0569	0.0567	0.0589	0.0590	0.0593

Notes: This table presents the regression results of one quarter ahead and one year ahead market-adjusted return on foreign institutional trading, prior quarter analysts' outputs, interaction between foreign institutional trading and prior quarter target price indicator variable and other control variables. Standard errors are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are adjusted for firm-level clustering and are robust to heteroscedasticity and autocorrelation. See Table 5-1 for variable definitions

Institutional investors' response to analysts' target price revisions is more pronounced in small firms and firms with lower analysts' coverage due to high information asymmetry in this type of firm (Lin et al., 2016). Therefore, the analysts' opinion is more valuable to institutional investors. Consequently, I posit that foreign institutional investors will be more interested in analysts' target price revisions for smaller firms and firms with lower analysts' coverage. To examine the impact of size and analysts' coverage, I interact the firm size and analysts' coverage with the target price revisions.

Table 5-8 shows the regressions estimates for Equation 5.4 in addition to the firm size and interaction term between analysts' target price revisions and firm size. To ease interpretation, I transform the firm size variable LOG(MV) to a dummy variable that equals one if the firm's size is larger than the median of the firm size variable in a particular year and zero otherwise ($Size_{Dummy}$). For brevity, I only report the firm size dummy variable, the target price revisions and the interaction term between the two variables.

The results in Table 5-8 are consistent with Lin et al. (2016). Specifically, the coefficient of target price revisions is positive and significant for all regressions (ΔTP) while the interaction term between the firm size and target price is negative and significant. Therefore, the results show that foreign institutional trading based on target prices is more pronounced for small firms and this association diminishes for large firms.

In Table 5-9, I show the regressions estimates for Equation 5.4 in addition to the analysts' coverage and interaction term between analysts' target price revisions and

analysts' coverage. To ease interpretation, I transform the analysts' coverage (Analysts' Coverage) to a dummy variable that equals one if the analysts' coverage is larger than the median of the analysts' coverage variable in particular year and zero otherwise ($Analyt_{Dummy}$). For brevity, I only report the analysts' coverage dummy variable, the target price revisions and the interaction term between the two variables.

The results show that the analysts' coverage moderates the association between the target price revisions and foreign institutional trading. While the coefficient of target price revision is positive and highly significant, the interaction term between the number of analysts following the firm and target price revisions is negative and significant suggesting that analysts' target price revisions are less valuable to foreign institutional investors when the number of analysts covering the firm increases. Overall, the results in Table 5-8 and Table 5-9 shows that foreign institutional investors value analysts' target price revisions more when the firm is the subject of high information asymmetry.

Table 5-8: Moderating effect of size on foreign institutional investors trading based on analysts' target price revisions

VARIABLES	ΔIO_For (1)	ΔINST_For (2)	ΔII_For (3)
ΔTP_{it}	0.300***	0.315***	25.814***
	(0.050)	(0.050)	(1.251)
$Size_{Dummy}$	0.043***	0.013	-2.954***
	(0.009)	(0.009)	(0.158)
$Size_{Dummy} \times \Delta TP_{it}$	-0.334***	-0.263***	-5.509***
	(0.080)	(0.079)	(1.460)
Constant	0.397***	0.424***	8.504***
	(0.059)	(0.065)	(1.412)
Observations	51,427	51,427	51,427
Control Variables	YES	YES	YES
Time Effect	YES	YES	YES
Industry Effect	YES	YES	YES
R-squared	0.422	0.421	0.161
Adj. R-squared	0.421	0.420	0.159

Notes: This table presents the regression results of the three proxies of foreign trading change in the percentage of institutional ownership (ΔIO_For), changes in the number of shares held by foreign institutional investors (ΔINST_For) and quarterly percentage of changes in the number of foreign institutional investors (ΔII_For) on the analysts' target price revisions (ΔTP), firms size dummy ($Size_{Dummy}$), the interaction term between target price revisions and firms size dummy. Standard errors are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are adjusted for firm-level clustering and are robust to heteroscedasticity and autocorrelation. See Table 5-1 variable definitions

Table 5-9 Moderating impact of analysts' following on foreign institutional investors trading and analysts target price revisions

VARIABLES	ΔIO_For (1)	ΔINST_For (2)	ΔII_For (3)
ΔTP_{it}	0.290***	0.310***	23.677***
	(0.051)	(0.051)	(1.239)
$Analyst_{Dummy}$	0.046***	0.025***	-2.744***
	(0.010)	(0.010)	(0.160)
$Analyst_{Dummy} \times \Delta TP_{it}$	-0.272***	-0.233***	-0.174
	(0.082)	(0.082)	(1.494)
Constant	0.407***	0.424***	7.813***
	(0.060)	(0.063)	(1.260)
Observations	51,427	51,427	51,427
Control Variables	YES	YES	YES
Time Effect	YES	YES	YES
Industry Effect	YES	YES	YES
R-squared	0.422	0.421	0.160

Notes: This table presents the regression results of the three proxies of foreign trading change in the percentage of institutional ownership (ΔIO_For), changes in the number of shares held by foreign institutional investors (ΔINST_For) and quarterly percentage of changes in the number of foreign institutional investors (ΔII_For) on the analysts target price revisions (ΔTP), number of analysts following dummy ($Analyst_{Dummy}$), the interaction term between target price revisions and number of analysts following dummy and other determinates of institutional trading. Standard errors are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are adjusted for firm-level clustering and are robust to heteroscedasticity and autocorrelation. See Table 5-1 variable definitions

5.6 Conclusion

In this chapter, I have examined the usefulness of analyst target prices to unique type of investors. In particular, I have tested whether foreign institutional investors respond to revisions in target prices. More importantly, how such behaviour impacts their profitability in the subsequent quarter (2013), shows that foreign institutional investors are at an information disadvantage. Therefore, they earn negative future abnormal returns due their poor stock picking ability in the host country. Building directly on that, I argued that analyst are informed users of financial information who disseminate valuable information to market participants. Therefore, foreign institutional investors might benefit from analyst target price revisions to identify the mispriced stocks. In line with the prediction of this chapter, I found a positive and significant increase in foreign institutional ownership in response to a positive change in analysts' target prices, which leads to positive future abnormal returns. These results hold after controlling for set of comprehensive factors that impact institutional trading.

Overall, I have provided evidence that analysts play a crucial role in disseminating information to different types of market participants such as foreign institutional investors. More importantly, I show that foreign institutional trading based on analysts' target prices, promotes price discovery. Therefore, this chapter has strong implications for enhancing the general knowledge in how foreign institutional investors can perform better in the capital market.

This chapter has built on Lin et al. (2016) by testing whether the lack of profitability of target price revisions can be explained by the argument proposed by Kacperczyk and

Seru (2007) surrounding the profitability of public information. In addition, Lin et al. (2016) have also proposed that the lack of profitability of target price revisions to institutional investors might be explained by their overreaction to this information as a herd. Therefore, in Chapter 6, I empirically examine the proposition of Lin et al. (2016) concerning whether institutional investors herd when following analysts target price revisions.

6 Do Institutional Investors Herd when Following Analysts Target Prices?

6.1 Introduction

Sell-side analysts issue research reports which contain mainly stock recommendations, earnings forecasts and target prices. Target price is an estimation of a stock's future price, generally over the 12 months following the release date (Asquith et al., 2005). In contrast with a discrete signal provided by stock recommendations (e.g., buy, hold and sell), target prices provide a continuous signal with concise horizon (Chen et al., 2016) that can easily be compared among analysts (Gleason et al., 2013). Moreover, analysts explicitly express their opinions when setting target prices (Huang et al., 2009). Due to the aforementioned uniqueness and popularity of the target prices in the analysts' reports, academic research discussing its usefulness has increased recently.

Most research conducted on target prices concludes that they are informative and convey unique information to investors (e.g., Brav and Lehavy, 2003, Asquith et al., 2005, Huang et al., 2009, Da and Schaumburg, 2011, Lin et al., 2016). Among different types of investors, institutional investors were recently found to trade based on target price revisions (Lin et al., 2016). Yet, according to the aforementioned paper, this trading behaviour does not contribute to their profitability. The lack of the profitability of target price revisions to institutional investors remains puzzling in the presence of the documented evidence of the usefulness of target prices. Lin et al. (2016) propose that one explanation of this puzzling finding is that institutional investors might be

overreacting as a herd in response to analysts' target price revisions. In this chapter, I aim to examine the proposition by Lin et al. (2016), whether institutional investors are herding using analysts' target price revisions and, more importantly, whether such behaviour impacts the stock prices.

A number of academic papers show that institutional investors respond to sell-side analysts' forecasts as informed users. As a group, institutional investors rely on analysts' earnings' forecasts Walther (1997), traded based on information contained in target prices (Lin et al., 2016), and generate excess returns when trading on analysts' stock recommendations (Chen and Cheng, 2006, Green, 2006, Irvine et al., 2007). Moreover, institutional investors appear to be more aware of the inherent bias and conflicts in analysts' recommendations, compared to small investors who naively follow the analysts' advice (Malmendier and Shanthikumar, 2007, Mikhail et al., 2007, Malmendier and Shanthikumar, 2014). Consequently, large institutional investors have generated significantly higher abnormal returns, compared to small individual investors who naïvely respond to stock recommendations (Malmendier and Shanthikumar, 2014). Yet, Brown et al. (2014) document that mutual fund managers have overreacted as a herd when using stock recommendations, a behaviour which pushes the prices away from the fundamental value. Lin et al. (2016) built on this conclusion to explain the lack of profitability of target price revisions to institutional investors.

Lin et al. (2016) evidence that institutional investors trade based on target prices. Yet, this trading behaviour does not contribute to their profitability in the near future. Therefore, Lin et al. (2016) propose that institutional investors might be herding when using target prices. However, this proposition has not been examined and whether

institutional investors herd remains largely unexplored. It is reasonable to expect that institutional investors trade based on target prices in a rational manner. Target price revisions contain useful information to investors (Asquith et al., 2005), and institutional investors are informed users of such information who tend to use analysts' outputs in a sophisticated manner (Malmendier and Shanthikumar, 2014). In addition, institutional investors pay soft-dollar commissions to large brokerage houses to benefit from timely access to analysts' research (Chen and Cheng, 2006). Thus, institutional investors are expected to respond to target prices as rationally-informed users.

However, institutional investors are prone to behavioural biases. For example, institutional investors herd in the capital market (Sias, 2004). Moreover, equity mutual fund managers are overconfident (Puetz and Ruenzi, 2011). In addition, institutional investors are sentiment traders who are responsible for destabilising the market through sentiment-induced demand shocks (DeVault et al., 2018). These contradicting results make it hard to predict whether institutional investors use analyst target prices in an informative manner or herd when using it and, if so, how such behaviour impacts prices of the stocks in the capital market.

This chapter aims to examine the herding behaviour overall, and for different types of institutional investors when using target price revisions, along with the impact of any herding on stock prices. Unlike previous studies, I test the herding behaviour of institutional investors in an analyst context. By doing so, I test whether the interaction between institutional investors and analysts - as two of most sophisticated users of financial information - promote price discovery or harm stock prices in the short- and long-run. I further explore whether different types of institutional investors use

information provided by analysts in different ways. Third, I consider multiple analyst outputs, as in Bradshaw (2011), by testing the impacts of target price revisions along with earnings forecasts' revisions and stock recommendation revisions simultaneously. Lastly, I shed light on the post-regulation FD period which presents a fruitful setting to test the interaction between analysts and institutional investors in the assumed absence of private information from management (Ke et al., 2008).

Using quarterly data from the second quarter of 2003 until the fourth quarter of 2013, I find that institutional investors do herd when using target prices. This relationship remains significant after controlling for other analysts' output and stock characteristics which might affect the herding behaviour of institutional investors. After disaggregating the institutional investors based on their investment horizon, I find that only short-term institutional investors herd following target price upgrades and downgrades. Nevertheless, the herding behaviour of neither short-term nor long-term institutional investors destabilise the stock prices. Specifically, I find consistent evidence that the herding behaviour of short-term institutional investors explained by target price revisions has a positive impact on the subsequent stock returns.

I provide evidence that unlike long-term institutional investors, short-term institutional investors push stock prices toward fundamentals. I also can infer that short-term institutional investors are sophisticated investors who are following target prices revisions in an informed manner, a behaviour which positively impacts the subsequent return. This chapter also contributes to resolving Lin et al. (2016) argument that institutional investors tend to overact while responding to target prices revisions to look prudent. I challenge this finding by providing empirical evidence that institutional

investors' herding in response to target prices revisions does not negatively impact the stock prices in the short- and long-run.

This chapter proceeds as follows. The next section discusses the relevant literature; section 6.3 develops the hypotheses; section 6.4 describes the methodology. Section 6.5 outlines the results and Section 6.6 presents the conclusions.

6.2 Literature Review

6.2.1 Analysts Target prices

Target price forecasts are an estimation of a stock's future price, generally over a 12 month period, containing distinct information, to which investors react, beyond stock recommendations and earnings forecasts (Asquith et al., 2005). Analysts explicitly express their opinions when setting target prices (Huang et al., 2009) and they revise it more frequently than stock recommendations (Lin et al., 2016). Further, target prices provide a continuous signal with concise horizon, compared with a discrete signal provided by stock recommendations (Chen et al., 2016). In contrast with stock recommendations and earnings forecasts, target prices are a verifiable signal that can easily be compared among analysts (Gleason et al., 2013). Therefore, the usefulness of target prices has attracted academic studies recently.

Brav and Lehavy (2003), using a large sample of target prices, stock recommendations and earnings forecasts between 1997 and 1999, document the incremental information value of the target prices revisions even in the presence of earnings forecasts and stock recommendations. Asquith et al. (2005) confirm the earlier evidence and show that the

market reaction to the changes in the target prices was more significant for the same percentage of changes in earnings forecast. Moreover, Huang et al. (2009) have shown that an investment strategy based on the changes of the revisions of both stock recommendation and target prices would lead to higher adjusted risk returns than a strategy based solely on the revisions of the consensus stock recommendation, or the revision of the consensus target prices. In addition, Gleason et al. (2013) argue that analysts produce better-quality target prices when they use more sophisticated valuation models - such as the residual income valuation model - than when using simple valuation models such as price to earnings. Furthermore, they document that analysts who issue accurate earnings - key input to forecast target prices - have more accurate target prices.

Following the documented evidence of the usefulness of the target prices to market participants, two studies examine the usefulness of target price revisions to institutional investors. Hashim (2015) evidences that institutional investors respond to target prices by emphasising that All-star analysts' ranking impacts institutional investors trading decisions based on target prices revisions. More importantly, Lin et al. (2016) find that institutional investors trade based on information contained in target price revisions after controlling for other analysts' outputs and institutional trading determinants documented in the previous literature. Short-term institutional investors mainly guides this trading behaviour. Yet, Lin et al. (2016) argue that institutional investors do not generate any abnormal future returns by trading based on target price revisions. Therefore, Lin et al. (2016) study suggests that institutional investors might be overreacting as a herd when responding to analysts' forecasts.

6.2.2 Institutional Investors Herding

Investors' herding has been defined as a "group of institutional investors following each other into (or out of) the same securities over some period of time" (Sias, 2004, p.166). The prior literature suggests a number of reasons, which might explain this behaviour. Choi and Sias (2009) summarise them using six main points. First, investigative herding occurs when institutional investors follow the cross-sectionally correlated signals. Second, an informational cascade occurs when institutional investors intentionally abandon their noisy private information to follow the acts of other investors. Third, reputational herding occurs when institutional investors are concerned with appearing bold for the sake of their careers and, thus, follow other investors. Fourth, positive feedback trading occurs when most of the institutional investors act as momentum traders; buying past winners and selling past losers. Fifth, characteristics herding occurs because of the similar preferences of institutional investors in picking stocks. Lastly, fads occur as institutional investors tend to trade on the most popular stock.

One of the most influential papers on herding behaviour is Lakonishok et al. (1992), which examines the herding behaviour of 769 tax-exempt pension fund managers between 1985 and 1989. Lakonishok et al. (1992) find little evidence that pension fund managers herd or follow positive feedback when trading in large capitalisation securities. Yet, institutional investors show higher tendency to herd in small-cap stocks. More importantly, in addition, Lakonishok et al. (1992) conclude that pension fund managers did not contribute to destabilise the stock prices. Grinblatt et al. (1995) found small yet economically significant evidence of herding by mutual fund managers and strong evidence of momentum trading. Further, Wermers (1999) finds that, compared with

pension funds, mutual funds managers show a higher, but still weak tendency, to herd in the market. Moreover, mutual funds managers herd more when buying and selling small stocks with high past return (the past winners).

Yet, Sias (2004) concludes that institutional investors herd significantly in the capital market, acknowledging that the difference in results is due to different methodologies, not different samples. While Lakonishok et al. (1992) test for the herding behaviour of the institutional investors within the same period (simultaneously) by applying the cross-sectional temporal model, Sias (2004) tests the cross-sectional correlation between institutional trades within the same, and next quarter. In addition, Sias (2004) argues that while there is consistent evidence that institutional investors are momentum traders who follow signals of previous returns, institutional investors follow their own buying behaviour and other institutional investors' buying behaviour more than past returns. Lastly, this study found that institutional herding behaviour did not move the stock prices away from the fundamental value.

Finally, Brown et al. (2014) argue that the reliance of mutual fund managers on sell-side analysts leads to observed herding behaviour in following analysts' stock recommendation revisions. In particular, this study found that mutual fund managers display higher tendency to herd following downgrades in stock recommendation revisions compared to upgrades, due to career concerns. In addition, mutual fund managers with a low rating and shorter managerial tenure are more likely to herd. Moreover, mutual fund managers' herding based on their career concerns negatively impacts stock returns in subsequent periods. The latter result is consistent with the prediction that overreacting caused by reputational herding contributes to destabilising

stock prices and moving them away from fundamentals. The results shown by Brown et al. (2013) signal the need for more research to explore whether overall institutional investors herd when using other analysts' outputs. Besides stock recommendations, analysts' sell-side reports contain earnings forecasts and target prices.

6.3 Hypothesis Development

Target prices show analysts' precise estimate of the firms' expected stock price. While early in the literature the main reasons behind issuing target prices were questioned (Bradshaw, 2002), more recent studies provide consistent evidence that target prices have investment value to which investors react (e.g., Brav and Lehavy, 2003, Asquith et al., 2005, Huang et al., 2009, Da and Schaumburg, 2011, Da et al., 2016). Recently, Lin et al. (2016) find that institutional investors trade based on information contained in target price revisions, particularly, short-term institutional investors. However, they fail to find evidence that institutional trading based on target price revisions generate any abnormal future returns, suggesting that institutional investors might be overreacting as a herd to look prudent in the market.

While several reasons may explain the herding behaviour of institutional investors, it is hard to empirically identify the exact reason behind such herding (Cai et al., 2018).[24] Therefore, academic studies have examined this issue by testing its impact on the future stock prices in an attempt to identify the main causes of herding. Early in the literature, several studies concluded that institutional herding is informational based, therefore, it does not negatively impact stock prices (e.g., Wermers, 1999, Nofsinger and Sias, 1999,

[24]The main reasons behind herding are discussed in section 2.5.7.2.

Sias, 2004, Choi and Sias, 2009). However, more recent studies find a destabilising effect of institutional herding on stock prices (e.g., Sharma et al., 2006, Puckett and Yan, 2008, Dasgupta et al., 2011). This is further supported by Brown et al. (2014) who document that mutual fund managers herd based on their career concerns, resulting in negative impact on stock returns in the subsequent period. This is consistent with the prediction that overreacting caused by reputational herding destabilises stock prices and moves them away from fundamentals; a conclusion Lin et al. (2016) use to explain the lack of target prices profitability to institutional investors.

Yet, Lin et al. (2016) have not examined the herding behaviour of institutional investors in responding to target price revisions. More importantly, the implications of Lin et al. (2016) suggestion that institutional investors might be overreacting, therefore, destabilising stock prices, in the long run, have not been examined. The lack of profitability of target price revisions to institutional investors documented by Lin et al. (2016) remains puzzling. Particularly, in the presence of the well-documented evidence of the profitability of target prices revisions. To further understand whether institutional investors are overreacting as a herd in responding to target prices and why trading based on target price revisions is unprofitable, I test the following hypothesis:

H1*: Institutional investors herd (trade together) in response to analysts' target price revisions*

Institutional investors are a heterogonous group of financial information in the capital market. One of the main drivers of their behaviour in the capital market is the investment horizon. Ke and Ramalingegowda (2005) show that only short-term institutional investors can exploit post-earnings announcement drift to earn positive

abnormal returns. Further, Yan and Zhang (2009) argue that short-term institutional investors are mostly responsible for the positive association between institutional investors trading and the subsequent stock returns. This is consistent with their prediction that short-term institutions are more informed than long-term institutional investors and also are more willing to trade based on their information. More importantly, Yüksel (2015) has found that both short-term and long-term institutional investors herd in the market. Yet, only long-term institutional investors push the prices away from their fundamental value. Yüksel (2015) argues that short-term institutional investors are better informed than long-term institutional investors.

Lin et al. (2016) document that only short-term institutional investors respond to target price revisions. Building on that and on the documented literature that the investment horizon impacts how the institutional investors behave in the market, I will disaggregate institutional investors to short-term and long-term to test how they behave in responding to target price revisions in the market. I, therefore, predict that, compared to long-term institutional investors, short-term institutional investors, characterised as active users of short-lived financial information, will herd more in responding to target price revisions. Thus, the second hypothesis is:

H2*: Compared to long-term institutional investors, short-term institutional investors show a higher tendency to herd (trade together) in response to analysts' target price revisions*

While most of the research showed that institutional investors tend to herd in the capital market, empirically identifying the main reasons behind such behaviour remains challenging. To overcome this issue, a considerable number of academic papers have

distinguished between the main drivers of institutional herding as informational or non-informational by examining the impact of such behaviour on subsequent returns (Koch, 2016). The herding is derived from information, if the institutional investors herding is followed by return continuation. Yet, if the herding behaviour is followed by return reversals, then it is derived from non-informational sources. Building on that, I investigate, in this chapter, the main driver for institutional investors' response to target price revisions by testing its impact on the stock prices in the short- and long-run. By doing so, I aim to empirically examine whether the lack of profitability documented by Lin et al. (2016) is due to institutional investors overreacting to target prices revisions intentionally to look prudent as proposed in the chapter. Hence, I will test the following hypotheses:

H3*: The herding behaviour of overall institutional investors does not positively impact future returns*

The main motivation behind testing institutional herding, is understanding its impact on asset pricing (Holmes et al., 2013), particularly with the large presence of institutional investors that might cause a large destabilizing effect if institutional herding was intentional. Different types of institutional investors might behave differently in the capital market. Therefore, the drivers of their herding and its impact on stock prices might be different. Ke et al. (2008) find that buy-side herding by short-term institutional investors is information-based while sell-side herding is non-information-based. More importantly, Yüksel (2015) finds that short-term institutional investors' herding does not negatively impact the stock prices, this is consistent with the discovery role the short-term institutional investors play in the market as more informed users. Nevertheless, Yüksel (2015) finds that long-term institutional investors' herding destabilises the stock

prices. Yüksel (2015) explains these findings by arguing that the level of informed trading varies between short- and long-term institutional investors. Therefore, the impact of their herding on stock prices varies based on the informational role they play in the capital market. In this chapter, I build on this literature by examining the impact of herding by different types of institutional investors when using target price revisions. I argue that the herding behaviour of short-term institutional investors in responding to target price revisions allows markets to incorporate information into stock prices. However, the herding behaviour of long-term institutional investors will drive the prices away from fundamentals. Therefore, the last hypothesis is:

H4*: Compared with long-term institutional investors, short-term institutional investors herding behaviour positively impact the future returns*

6.4 Methodology

6.4.1 Measuring Institutional Herding

Following Lakonishok et al. (1992) I construct the herding measure as follows:

$$HM_{it} = \left|P_{it} - P_t\right| - AF_{it} \quad (6.1)$$

Where,

P_{it} is the proportion of institutional investors who are classified as buyers in firm i during quarter t calculated as the number of institutional investors who are buying shares in firm i during quarter t relative to active institutional investors buying and selling shares in firm i in quarter t. An institutional investor is defined as a buyer (B_{it}) if he/she

increases the number of shares he/she owns relative to the number of shares outstanding in firm i during quarter t.

P_t is the sum of the all institutional investors buying shares in quarter t relative to the sum of all active institutional investors buying or selling shares in quarter t.

AF_{it} is an adjustment factor that accounts for the fact that under the null hypothesis of no herding, shares traded by institutional investors should have the same probability of being bought (versus sold) in a given quarter. Yet, due to the increase in the number of institutional investors with time, $|P_{it} - P_t|$ is greater than zero even if the trades are independent. The adjustment factor is the expected value of $|P_{it} - P_t|$ calculated by assuming P_{it} follows a binomial distribution with P_t probability of success.[25]

Next, since HM_{it} does not differentiate between buy- and sell-side herding, I follow Wermers (1999) to distinguish between buy- and sell-side herding as follows:

$$BHM_{it}=HM_{it} \mid P_{it} > P_t \tag{6.2}$$

$$SHM_{it}=HM_{it} \mid P_{it} < P_t \tag{6.3}$$

Where,

BHM_{it} /(SHM_{it}) is buy-side/ sell-side herding measure calculated as HM_{it} when firm i has a higher (lower) proportion of institutional investors buying shares (P_{it}) compared with the average of all firms during quarter t (P_t).[26]

25 See Section 6.4.2 for numerical example.

26 I follow Wermer (1999) and re-calculate the AF conditioned on $P_{it} > P_t$ for BHM_{it} or $P_{it} < P_t$ for SHM_{it} as explained in Section 6.4.2

Following Brown et al. (2014), I construct an adjusted herding measure which combines the buy-side herding and sell-side herding measure (ADJ_{it}). Specifically, for each quarter in the period and for each group BHM_{it} or (SHM_{it}), I subtract the minimum value for BHM or (SHM) in quarter t from each observation. Then, the ADJ_{it} were set as difference for BHM group and as -1 multiplied by the difference for SHM_{it} group. ADJ_{it} thus, proxy that the stock is heavily bought (sold) by a group of institutions. To capture the impact of short- and long-term institutional herding, I follow Yüksel (2015) and re-calculate the herding measure (ADJ_{it}) for the short- and long-term separately. The institutional investors' classification for short- and long-term is explained in Chapter 3.

6.4.2 Numerical Example for Adjustment Factor Calculation

The adjustment factor (AF) for firm i in quarter t accounts for the random variation under the null hypotheses of no herding. In this subsection, I show a numerical example of how I calculated the adjustment factor.

Franklin Electronic Publishers with a historical eight-digit CUSIP 35351510 has 10 active traders in the first quarter of year 2004. Three of the active traders were buyers while seven were sellers. The probability of any institutional investors being a buyer in the first quarter of 2004 (P_t) was 56%. The adjustment factor is calculated using the binomial distribution with parameters n (number of active traders) and probability P_t. The calculations are presented below in Table 6-1 with the result of an AF for LSV measure of .129.

$$AF=\sum_{k=0}^{k=n}\frac{n!*(P)\exp(k)*(1-P)\exp(n-k)}{\left[(n-k)!*k!\right]}X\left|\left(\frac{k}{n}-P\right)\right| \quad (6.4)$$

Table 6-1: Adjustment Factor Calculations

# Traders	# Buyers	%Buys	Probability	Binomial Probability	Value	Product
N	K	$\frac{k}{n}$	P	$\frac{n!*(p)\exp(k)*(1-p)\exp(n-k)}{[(n-k)!*k!]}$	$\left\|\left(\frac{k}{n}-p\right)\right\|$	P *Value
10	0	0	0.56	0.00	0.56	0.000
10	1	0.10	0.56	0.00	0.46	0.002
10	2	0.20	0.56	0.02	0.36	0.007
10	3	0.30	0.56	0.07	0.26	0.018
10	4	0.40	0.56	0.15	0.16	0.024
10	5	0.50	0.56	0.23	0.06	0.014
10	6	0.60	0.56	0.24	0.04	0.010
10	7	0.70	0.56	0.18	0.14	0.025
10	8	0.80	0.56	0.08	0.24	0.020
10	9	0.90	0.56	0.02	0.34	0.008
10	10	1.00	0.56	0.00	0.44	0.001
TOTAL				1		.129

I follow Wermers (1999) and re-calculate the adjustment factor conditioned on buy- or sell-side herding. I repeat the same steps but only considering the values where % Buys > P for BHM_{it} and % Buys < P for SHM_{it}. The probabilities are normalised to add up to 1.0 by dividing by the sum of the probabilities for buy-side herding and sell-side herding separately. The sum of the binomial probabilities for BHM group = 0.53 and the sum of the binomial probabilities for SHM group = 0.47. I normalise the BHM probabilities by dividing the binomial probabilities by the sum of the binomial probabilities of each group. Thus, the normalised probabilities for each group will add up to one. Then, the product is calculated by multiplying the normalised probability by the value for each group separately. The AF-BHM_{it} = .12 and AF-SHM_{it} = .14 as shown in Table 6-2.

Table 6-2: BHM and SHM Adjustment Factor Calculations

%Buys	Probability		Binomial Probabilities	Value	Normalised Probabilities BHM	Normalised Probabilities SHM	Product -BHM	Product -SHM
$\frac{k}{n}$	P		$\frac{n!*(p)exp(k)*(1-p)exp(n-k)}{[(n-k)!*k!]}$	$\left\|\left(\frac{k}{n}-p\right)\right\|$				
0	0.56	SHM	0.00	0.56		0.001		0.00
0.10	0.56	SHM	0.00	0.46		0.007		0.00
0.20	0.56	SHM	0.02	0.36		0.042		0.02
0.30	0.56	SHM	0.07	0.26		0.143		0.04
0.40	0.56	SHM	0.15	0.16		0.319		0.05
0.50	0.56	SHM	0.23	0.06		0.487		0.03
0.60	0.56	BHM	0.24	0.04	0.458		0.02	
0.70	0.56	BHM	0.18	0.14	0.333		0.05	
0.80	0.56	BHM	0.08	0.24	0.159		0.04	
0.90	0.56	BHM	0.02	0.34	0.045		0.02	
1.00	0.56	BHM	0.00	0.44	0.006		0.00	
TOTAL			1		1	1	.12	.14

6.4.3 Model Construction

Following Brown et al. (2014), I test the herding behaviour of institutional investors' in using analysts' target price revisions. Thus, I run the following regression:

$$HERD_{it} = \beta_0 + \beta_1\Delta TP_{it} + \beta_2\Delta REC_{it} + \beta_3\Delta EPS_{it} + \beta_4 RET_{it-1} + \beta_5 RET_{it-4,t-1} + \beta_6 SUE_{it} + \beta_7 LOG(MV_{it}) + \beta_8 LOG(BM_{it}) + \beta_9 VOL_{it} + \beta_{10} Turn_{it} + \beta_{11} Time_t + \beta_{12} Industry_i + \varepsilon_{it} \quad (6.5)$$

Where:

$HERD_{it}$ is either adjusted herding measure for overall institutional investors in firm i in quarter t (ADJ-Ttl_{it}), or the adjusted herding measure for short-term institutional investors in firm i in quarter t (ADJ-$Shrt_{it}$), or the adjusted herding measure for long-term institutional investors in firm i in quarter t (ADJ-Lng_{it}). ΔTP_{it} is the quarterly percentage change in the target prices (TP_{it}). TP_{it} is the target prices at the end of quarter t. Analysts' target prices at the end of the quarter is the average of all analysts' target prices at the end of the quarter.

In addition to the target price revisions, I control for several variables that are shown to influence institutional investors' herding. First, following Brown et al. (2014), I control for analysts' stock recommendation revisions (ΔREC_{it}) and analysts' earnings forecasts (ΔEPS_{it}) which are shown to positively impact institutional herding Analysts' stock recommendations are recoded so that 5 represents a strong buy, 4 presents beyond 3, 2 and 1 represent hold, sell and strong sell, respectively. Next, following Wermers (1999) and Sias (2004), I control for momentum trading, evidenced previously to impact institutional herding. Institutional investors are expected to be positive feedback traders who buy the past winners and sell the past losers. Momentum trading is captured using cumulative return in the prior quarter (RET_{it-1}) as well as the cumulative return in the nine months before the quarter t-1 ($RET_{it-4, it-2}$). Thus, RET_{it-1} and $RET_{it-4, it-2}$ are expected to be positively associated with institutional investors herding

Brown et al. (2014) also control for standardised unexpected earnings (SUE_{it}) in the same quarter as the analysts' reports increases in the days surrounding the earnings news and institutional investors might be herding following earnings news rather than analysts' target prices. Thus, SUE_{it} is expected to be positively associated with herding. I also control for adding and dropping from Standard and Poor index ($SPindex_{it}$) as the institutional investors should act as prudent investors (Gompers and Metrick, 2001). Thus, they are expected to trade in the firms following the index changes. In addition, I control for size (LOG (MV_{it})) as Lakonishok et al. (1992) and Wermers (1999) show that the herding behaviour is more pronounced in the small firms. Thus, the coefficient of (LOG (MV_{it})) is expected to be negative. I also control for book to market (LOG(BM_{it})) as Wermers (1999) shows that the herding behaviour is more pronounced for growth

stocks. Next I follow Yüksel (2015) to control for information uncertainty by including volatility (VOL_{it}) and turnover ratio ($TURN_{it}$). Then, I include year-quarter dummies to control for the dynamics of institutional investors trading. Finally, I include industry fixed effect using Fama-French 12 industry classifications to control for institutional herding in certain industries (Choi and Sias, 2009). The detailed calculation of the control variables can be found in Table 6-3.

Table 6-3: Variables Definition

Variable	Definition
IO_Ttl_{it}	= The number of shares held by all institutional investors divided by the number of shares outstanding at the end of the quarter
IO_Shrt_{it}	= The number of shares held by short-term institutional investors divided by the number of shares outstanding at the end of the quarter
IO_Lng_{it}	= The number of shares held by long-term institutional investors divided by the number of shares outstanding at the end of the quarter
$NO.Traders\_Ttl_{it}$	= The number of all institutional investors who either buy or sell in firm i in quarter t
$NO.Traders\_Shrt_{it}$	= The number of short-term institutional investors who either buy or sell in firm i in quarter t
$NO.Traders\_Lng_{it}$	= The number of long-term institutional investors who either buy or sell in firm i in quarter t
HM_Ttl_{it}	= Non-directional herding measure for all institutional investors in firm i in quarter t
HM_Shrt_{it}	= Non-directional herding measure for short-term institutional investors in firm i in quarter t
HM_Lng_{it}	= Non-directional herding measure for long-term institutional investors in firm i in quarter t
BHM_Ttl_{it}	= Buy-side herding measure for all institutional investors in firm i in quarter t
BHM_Shrt_{it}	= Buy-side herding measure for short-term institutional investors in firm i in quarter t
BHM_Lng_{it}	= Buy-side herding measure for long-term institutional investors in firm i in quarter t
SHM_Ttl_{it}	= The Sell-side herding measure for all institutional investors in firm i in quarter t
SHM_Shrt_{it}	= Sell-side herding measure for short-term institutional investors in firm i in quarter t
SHM_Lng_{it}	= Sell-side herding measure for long-term institutional investors in firm i in quarter t
ADJ_Ttl_{it}	= Adjusted herding measure for all institutional investors in firm i in quarter t
ADJ_Shrt_{it}	= Adjusted herding measure for short-term institutional investors in firm i in quarter t
ADJ_Lng_{it}	= Adjusted herding measure for long-term institutional investors in firm i in quarter t
TP_{it}	= The consensus target price in quarter t calculated as the mean of the most recent distinct analysts target price in the last six months before the end of quarter t
ΔTP_{it}	= The quarterly percentage change in TP_{it}
$TP\_Upgrade_{it}$	= The value of the positive ΔTP_{it} and "0" otherwise
$TP\_Downgrade_{it}$	= The value of the negative ΔTP_{it} and "0" otherwise
REC_{it}	= The consensus stock recommendation in quarter t, whereby recommendations are scaled as follows: 5. Strong Buy, 4. Buy, 3. Hold, 2, 2. Sell and 1. Strong Sell.
ΔREC_{it}	= The quarterly change in REC_{it}
EPS_{it}	= The most recent annual consensus earnings forecasts in quarter t calculated as the mean of the most recent distinct analysts target price in the last six months before the end of quarter t
ΔEPS_{it}	= The quarterly change in EPS_{it} divided by the price at the end of quarter t.
RET_{it_1}	= Cumulative monthly compounded stock return over the quarter t-1 to t.
$RET_{it-4,it-1}$	= Cumulative monthly compounded stock return over the quarter t-4 and t-1.
SUE_{it}	= The unexpected earnings for the most recent quarter relative to earnings four quarters before, scaled by the standard deviation of earnings over the prior six quarters.
$SPindex_{it}$.	= A dummy variable which takes a value 1 if the stock was added to the Standard and Poor index, −1 if it was dropped from the same index, zero otherwise.
MV_{it}	= The market value of equity calculated as the number of shares outstanding at the end of quarter t multiplied by the price at the end of quarter t.
LOG (MV_{it})	= The natural logarithm of MV_{it}
BM_{it}	= Ratio of book value to market value of equity at the most recent fiscal quarter end
LOG (BM_{it})	= The natural logarithm of BM_{it}
VOL_{it}	= Volatility is the standard deviation of the daily stock returns of firm i in quarter t.
$TURN_{it}$	= The average of the monthly turnover ratio over the past three months, whereby the monthly turnover ratio is calculated as the monthly trading volume divided by the number of shares outstanding at the end of the month

6.4.4 Data and Sample Selection

Analysts' forecasts are obtained from I/B/E/S for the period January 2003 to December 2013. In this chapter, analysts' forecasts prior to 2003 are discarded to avoid any confounding effects of significant regulatory changes leading up to this date from Regulation FD and the Global Research Analyst Settlement agreement. With the approval of Rule 2711 and NYSE Rule 472, these changes aim to increase the objectivity of analysts, restore confidence in the capital market, and protect investors. The initial sample consists of U.S. companies which have the available data to calculate the analysts' target price revisions, earnings forecasts and stock recommendation revisions. I use the I/B/E/S detail history file and keep the most recent forecast for each analyst issued no more than six months before and no less than two weeks prior to the end of quarter t for firm i. Next, observations with non-missing analysts' forecasts are merged with monthly stock prices from CRSP with share codes 10 and 11 and traded on NYSE, AMEX, and NASDAQ. This provides an initial sample of 124,025 firm-quarter observations as shown in Table 6-4.

Then, I exclude 20,966 firm quarter observations in the financial services industry and 11,191 firm quarter observations in the utility industry due to their specific nature leaving 91,868 firm-quarter observations. Then, I merge the sample obtained from I/B/E/S with firms which have sufficient data to calculate the institutional herding proxy. The institutional herding data is obtained from the Thomson-Reuters 13F institutional holding database in which firms' securities are identified by historical CUSIP, which allows merging with the data from I/B/E/S and CRSP. I also require the stock to be traded by at least five institutional traders each quarter to ensure that this measure

reasonably captures the concept of a herd. Thus, I remove 12,513 firm-quarter observations with missing institutional holding data.[27] Finally, I exclude observations missing the required data needed to calculate the control variables from CRSP and COMPUSTAT. The final sample, therefore, consists of 3,528 unique firms with 65,690 firm-quarter observations. Firm-quarters are shown in Table 6-4. I winsorize all continuous variables at the 1% and 99% level to minimize the effect of outliers.

Table 6-4: Sample selection

	Firm- Quarter Observations
Observations with share code 10 and 11 and have sufficient data from IBES	124,025
Less: firms in financial and utility industries	(32,157)
Less: firms with missing institutional holding information from 13F	(12,513)
Less: firms with missing information to calculate the controlling variables from CRSP and COMPUSTAT	(13,665)
Final Sample	65,690

Note: This table shows the sample selection process followed at the final sample of 65,690 U.S. firm-quarter between the second quarter of 2003 and the fourth quarter of 2013

6.4.5 Descriptive Statistics

The descriptive statistics of the key variables used in this study are shown in Table 6-5. Institutional investors hold 69.9% of the total number of shares outstanding (IO_Ttl_{it}) represented by 189 active institutional investors ($NO.Traders_{it}$). Splitting institutional investors based on their investment horizon shows that short-term institutional investors hold 30.5% while the long-term institutional investors hold only hold 14.4% of the total number of shares outstanding in a given firm and given quarter.

[27] I follow Yan and Zhang (2008) and remove all the observations with more than 100% total institutional ownership in any quarter.

The average level of herding for all institutions is 6.1% over the sample period. This number can be interpreted as if 100 institutional investors are trading in a given stock quarter, six of whom are trading "on the same side of the market" more than would be expected if trading independently (Wermers, 1999). After classifying the herding into buy- and sell-side herding, the descrptive shows that total and long-term institutional investors herd more in the buy-side compared with the sell-side which is consistent with Yüksel (2015) who argues that this can be explained by the fact that 13F is only required to report the long position. However, the herding measure is constructed to capture short selling positions.

After disaggregating institutional investors to short- and long-term, Table 6-5 shows that the average level of herding for long-term institutional investors is larger than the average level of herding for short-term institutional investors. This is noteworthy as long-term institutional investors are expected to be passive investors and their ownership of stocks is relatively smaller than the ownership of short-term institutional investors.

Statistics for analysts' outputs shows that the average firm received a target price of $30.1 (TP), earnings forecast of $1.18, and consensus stock recommendation of 3.66 (REC). An analysis of the quarterly change in these outputs over the sample period shows that they tend to higher their average target prices, earnings forecasts and lower their consensus stock recommendations.

The control variables show the sample of this chapter has a small number of large firms as shown by a quarterly average/(median) market capitalisation of $4.901 billion/($.834 billion). Further, the average firm reports a book value of little under half

their market value shown by the BM ratio of 50.1%, cumulative return of 4.6%. The measure of share turnover (TURN) shows, on average, 21.2% of a firm's shares were traded over the quarter. For the measures of risk, average volatility (Vol) in the current quarter is 2.8%.

Table 6-5: Pooled descriptive statistics

Variable	N	Min	Mean	Sd	P50	Max
Panel (A) Institutional investors variables						
IO_Ttl_{it}	65,690	13.3%	69.9%	20.6%	74.8%	99.0%
IO_Shrt_{it}	65,690	3.0%	30.5%	13.7%	30.0%	63.1%
IO_Lng_{it}	65,690	1.5%	14.4%	8.3%	13.3%	40.0%
$NO.\ Traders\_Ttl_{it}$	65,690	5	189	206	122	1959
$NO.Traders\_Shrt_{it}$	65,690	5	78	60	60	546
$NO.Traders\_Lng_{it}$	65,690	5	43.9	69.9	22	683
HM_Ttl_{it}	65,690	-0.047	0.061	0.080	0.046	0.396
HM_Shrt_{it}	65,690	-0.080	0.027	0.062	0.016	0.232
HM_Lng_{it}	65,690	-0.120	0.061	0.104	0.051	0.343
BHM_Ttl_{it}	29,581	-0.050	0.070	0.097	0.050	0.413
$BHM_{it}\_Shrt_{it}$	31,026	-0.073	0.026	0.061	0.014	0.219
$BHM_{it}\_Lng_{it}$	31,275	-0.099	0.068	0.108	0.057	0.342
SHM_Ttl_{it}	36,109	-0.048	0.052	0.061	0.044	0.249
$SHMit\_Shrt_{it}$	34,664	-0.076	0.028	0.063	0.017	0.242
$SHM_{it}\_Lng_{it}$	34,415	-0.098	0.054	0.098	0.044	0.342
ADJ_Ttl_{it}	65,690	-0.353	-0.019	0.203	-0.115	0.513
ADJ_Shrt_{it}	65,690	-0.332	-0.017	0.159	-0.074	0.296
ADJ_Lng_{it}	65,690	-0.443	-0.020	0.212	-0.055	0.426
Panel (B) Analysts' forecasts variables						
TP_{it}	65,690	2.750	30.100	26.400	22.700	163.000
ΔTP_{it}	65,690	-0.470	0.029	0.180	0.018	0.700
REC_{it}	65,690	1.000	3.660	0.720	3.670	5.000
ΔREC_{it}	65,690	-4.000	-0.012	0.628	0.000	4.000
EPS_{it}	65,690	-4.360	1.180	1.750	0.899	8.090
ΔEPS_{it}	65,690	-3.590	0.000	0.689	0.008	3.390
Panel (C) Control variables						
RET_{it-1}	65,690	-0.523	0.046	0.239	0.035	0.913
$RET_{it-1: it-4}$	65,690	-0.719	0.147	0.500	0.075	2.350
SUE_{it}	65,690	-10.200	0.079	2.100	0.191	5.500
$SPindex_{it}$	65,690	-1	0.005	0.169	0.000	1
MV_{it}(in millions)	65,690	44	4901	13762	834	102659
$LOG(MV_{it})$	65,690	17.600	20.800	1.640	20.500	25.400
BM_{it}	65,690	0.052	0.501	0.346	0.419	1.970
$LOG(BM_{it})$	65,690	-2.960	-0.918	0.703	-0.870	0.677
VOL_{it}	65,690	0.009	0.028	0.015	0.025	0.089
$TURN_{it}$	65,690	0.025	0.212	0.165	0.166	0.952

This table summarises the main sample statistics of key variables for the 65,690 firm-quarter observations in the sample of listed U.S companies between 2003 and 2013. The definition of the variables as in Table 6-3.

6.5 Empirical Results

6.5.1 Institutional Investors' Herding and Target Price Revisions

In this section, I examine the association between institutional herding and target price revisions, controlling for other stock characteristics described in section 6.4.3. In column 1 of Table 6-6, I examine the impact of analysts' target prices on the herding behaviour of all institutional investors ($ADJ\text{-}Ttl_{it}$) and find that institutional investors do herd following target price revisions (ΔTP_{it}). Consistent with prior literature, the results suggest that institutional investors engage in momentum trading. Specifically, I find that an increase in analysts' earnings forecast (ΔEPS_{it}), the past quarter returns (RET_{t-1}) and standardised unexpected earnings (SUE_{it}) are all positively and significantly associated with institutional herding and herding is stronger in small and growth stocks, shown by the negative coefficient of $LOG(MV_{it})$ and $LOG(BM_{it})$.

Next, following Yan and Zhang (2009), I separate institutional investors by their investment horizon. The results for short-term institutional investors in column 2 show a high tendency to herd following target price revisions, consistent with the prediction in H2. Further, for long-term institutional investors, I also find a positive association yet with a smaller coefficient. Overall, the results are consistent with Yan and Zhang (2009) and Yüksel (2015) who argue that short-term institutional investors trade more compared with long-term institutional investors - on transient information such as analysts' forecasts. Regarding the control variables for short- and long-term institutional investors, I find that the herding of both groups is stronger in small and growth stocks which can be justified by the prediction that herding behaviour is more pronounced as the information uncertainty is high in small and growth stocks Yüksel (2015). The

differences in the coefficients related to the momentum trading can be due the variation in the level of informativeness between short- and long-term investors.

Lastly, $SPindex_{it}$ is only significant for long-term institutional investors. This is expected due to the passive nature of long-term institutional investors trading who are specialised in index trading. Thus, the positive coefficient of $SPindex_{it}$ variable suggests that long-term institutional investors herd more strongly when buying stocks that have been added to S&P500 and selling the stocks that have been dropped from the index.

Table 6-6: Regression of institutional herding on target price revisions

VARIABLES	**ADJ- Ttl_{it}**	**ADJ-$Shrt_{it}$**	**ADJ- Lng_{it}**
	(1)	**(2)**	**(3)**
ΔTP_{it}	0.044***	0.073***	0.015***
	(0.000)	(0.000)	(0.006)
ΔREC_{it}	-0.002*	-0.000	-0.004***
	(0.056)	(0.779)	(0.004)
ΔEPS_{it}	0.002	0.002	-0.001
	(0.111)	(0.101)	(0.321)
RET_{it-1}	0.020***	0.046***	-0.016***
	(0.000)	(0.000)	(0.000)
$RET_{it-4,it-2}$	0.006***	-0.007***	0.012***
	(0.005)	(0.000)	(0.000)
SUE_{it}	0.001*	0.002***	0.000
	(0.067)	(0.000)	(0.370)
$SPindex_{it}$	0.005	-0.003	0.012**
	(0.301)	(0.394)	(0.018)
$LOG(MV_{it})$	-0.005***	-0.007***	-0.004***
	(0.000)	(0.000)	(0.003)
$LOG(BM_{it})$	-0.010***	-0.005***	-0.021***
	(0.000)	(0.000)	(0.000)
VOL_{it}	-0.899***	0.174**	-1.113***
	(0.000)	(0.039)	(0.000)
$Turn_{it}$	0.207***	0.133***	0.036***
	(0.000)	(0.000)	(0.000)
Constant	0.095***	0.119***	0.074***
	(0.000)	(0.000)	(0.009)
Observations	65,690	65,690	65,690
Time Effect	YES	YES	YES
Industry Effect	YES	YES	YES
R-squared	0.042	0.047	0.037
Adj. R-squared	0.041	0.046	0.036

Notes: This table presents the regression results of the institutional investors adjusted herding (ADJ_{it}) on the consensus target price revisions (ΔTP_{it}) and other determinates of institutional herding. Standard errors are adjusted for firm-level clustering and are robust to heteroscedasticity and autocorrelation. Two-tailed p-values are presented in parentheses. *** p <0.01, ** p < 0.05, *p<0.1. See Table 6-3 for variable definitions.

6.5.2 Positive versus Negative Target Price Revisions

Next, I split the target price revision to upgrade and downgrades to compare its effect on herding by overall, short- and long-term institutional investors. I follow Brown et al. (2009) to test the "asymmetric response" of institutional investors to target price revisions. By doing so, I am trying to rule-out the assumption that institutional investors are responding to other signals the analysts observe. In Table 6-7, the results show that only short-term institutional investors are responding in the same direction of target prices revisions. Further, in an unreported test, I follow Brown et al. (2009) and test the difference between the coefficients of upgrade and downgrade. However, I could not find any statistical difference between the responses of short-term institutional investors to target price revisions upgrades versus downgrades.

Overall, the results in Table 6-6 and Table 6-7 show that overall, short- and long-term institutional investors react to the target price revision. Nevertheless, only short-term institutional investors respond to the content of information in the target price revisions by buying following upgrades and selling following downgrades. However, the results in Table 6-6 and Table 6-7 do not provide an explanation of why short- and long-term institutional investors herd in this manner. More importantly, the prior results did not show the impact of such behaviour on the stock prices.

Table 6-7: Regression of institutional herding on target price upgrades and target prices downgrades

VARIABLES	ADJ- Ttl_{it} (1)	ADJ-$Shrt_{it}$ (2)	ADJ- Lng_{it} (3)
$TP\_Upgrade_{it}$	0.070***	0.105***	0.015*
	(0.000)	(0.000)	(0.054)
$TP\_Downgrade_{it}$	-0.003	0.015*	0.017
	(0.798)	(0.081)	(0.153)
ΔREC_{it}	-0.002*	-0.000	-0.004***
	(0.069)	(0.895)	(0.004)
ΔEPS_{it}	0.002*	0.002*	-0.001
	(0.092)	(0.075)	(0.320)
RET_{it-1}	0.021***	0.047***	-0.016***
	(0.000)	(0.000)	(0.000)
$RET_{it-4,it-2}$	0.006***	-0.007***	0.012***
	(0.002)	(0.000)	(0.000)
SUE_{it}	0.001**	0.002***	0.000
	(0.039)	(0.000)	(0.373)
$SPindex_{it}$	0.005	-0.003	0.012**
	(0.290)	(0.413)	(0.018)
$LOG(MV_{it})$	-0.005***	-0.007***	-0.004***
	(0.000)	(0.000)	(0.003)
$LOG(BM_{it})$	-0.010***	-0.005***	-0.021***
	(0.000)	(0.000)	(0.000)
VOL_{it}	-1.031***	0.011	-1.109***
	(0.000)	(0.896)	(0.000)
$Turn_{it}$	0.204***	0.129***	0.036***
	(0.000)	(0.000)	(0.000)
Constant	0.091***	0.115***	0.074***
	(0.000)	(0.000)	(0.009)
Observations	65,690	65,690	65,690
Time Effect	YES	YES	YES
Industry Effect	YES	YES	YES
R-squared	0.042	0.048	0.037
Adj. R-squared	0.041	0.047	0.036

Notes: This table presents the regression results of the institutional investors adjusted herding (ADJ_{it}) on $TP\_Upgrade_{it}$, $TP\_Downgrade_{it}$ and other determinates of institutional herding. Standard errors are adjusted for firm-level clustering and are robust to heteroscedasticity and autocorrelation. Two-tailed p-values are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. See Table 6-3 for variable definitions

6.5.3 Institutional Herding and Abnormal Stock Return

6.5.3.1 Portfolio Analyses

To investigate the association between stock return and institutional herding following target price revisions, I follow Brown et al. (2014) and construct double-sorted portfolios based on analysts' target price revisions and institutional investors herding. To do so, I split the sample to upgrades and downgrades in target prices revision during the quarter.[28] Then, for each group, I separately construct five portfolios based on the BHM_{it} (B1-B5) and five portfolios based on SHM_{it} (S1-S5). Therefore, I constructed 20 portfolios, each portfolio is double-sorted based on the direction of both herding and target price revisions. For brevity, I show in Table 6-8, Table 6-9 and Table 6-10 the time-series average abnormal returns for the four extreme portfolios; strong sell following downgrade, strong buy following downgrade, strong sell following upgrade and strong buy following upgrade along with the comparisons between the four portfolios. The average abnormal returns for each portfolio are calculated using an equal-weighted Daniel et al. (1997) characteristics approach.[29][30]

[28] For this test, I follow Brown et al. (2009) and drop firm-quarter observation with zero changes in target price revisions.

[29] To calculate the equal weighted DGTW characteristics benchmark return, I use a three-way ranking procedure used by Daniel et al. (1997) which results in 125 portfolios, each having a distinct combination of size, book-to-market, and momentum trading. The 125 benchmark portfolios are rebalanced at the end of each month. Then, we calculate the equal weighted monthly adjusted abnormal return for a given stock as the return minus the equal weighted DGTW characteristics benchmark return at the end of the month. Then, we compounded that adjusted abnormal return during the quarter.

[30] DGTW characteristics benchmark return is widely used in the herding literature. Wermers (2003), Brown et al (2013), Yuksel (2015) among others have used this approach to calculate returns.

Table 6-8 examines this association for overall institutional investors while Table 6-9 and Table 6-10 reports the results for short- and long-term institutional investors, respectively. The results in Table 6-8, Table 6-9 and Table 6-10 show, unlike Brown et al. (2009), a reversal in the buy-side whether analysts are upgrading or downgrading. Moreover, when comparing the two portfolios in the buy-herding side, I observe no significant difference in the future return patterns between these two portfolios. The results apply to three groups of institutional investors; overall, short- and long-term. Regarding sell-side herding, neither strong sell following downgrades nor strong sell following upgrades exhibit any return reversals. Moreover, when comparing extreme sell herding following upgrade by extreme sell herding following downgrades, I find no statistical difference between the two groups.

Lastly, I calculate the differences between the four extreme portfolios. In the three Tables, Table 6-8, Table 6-9 and Table 6-10, I found that in a zero-investment portfolio stocks are strongly bought following upgrade and shorts stocks are strongly bought following downgrades (4-1) generates significant positive abnormal return in the current and subsequent quarter. More importantly, no reversals were observed in the subsequent quarter. Therefore, most of the results show a significant positive impact of herding following analysts' target price revisions. Nevertheless, as mentioned in Brown et al. (2014), portfolio analyses should be interpreted with caution. Therefore, in the following subsection, I run multivariate regressions to test the impact of institutional herding after controlling for other factors that might impact the stock prices.

Table 6-8: Abnormal returns of overall institutional herding and target price revisions portfolios

Portfolios	Qt-2	Qt-1	Qt	Qt+1	Qt+2	Qt+3	Qt+4
Downgrade strong sell (1)	-0.006	-0.067***	-0.108***	-0.006	-0.002	-0.012**	0.002
	(0.245)	(0.000)	(0.000)	(0.203)	(0.726)	(0.014)	(0.641)
Downgrade strong buy (2)	-0.023***	-0.052***	-0.104***	-0.017***	-0.003	-0.013***	-0.009*
	(0.000)	(0.000)	(0.000)	(0.003)	(0.571)	(0.007)	(0.062)
Upgrade strong sell (3)	0.027***	0.059***	0.067***	0.003	-0.013**	-0.005	-0.013***
	(0.000)	(0.000)	(0.000)	(0.425)	(0.012)	(0.138)	(0.006)
Upgrade strong buy (4)	0.017***	0.056***	0.093***	0.003	-0.012**	-0.014***	-0.007
	(0.000)	(0.000)	(0.000)	(0.376)	(0.013)	(0.004)	(0.133)
Test of differences							
Portfolios	Qt-2	Qt-1	Qt	Qt+1	Qt+2	Qt+3	Qt+4
(3)-(1)	0.033***	0.126***	0.175***	0.010	-0.012	0.006	-0.015*
	(0.000)	(0.000)	(0.000)	(0.136)	(0.115)	(0.265)	(0.015)
(4)-(2)	0.040***	0.107***	0.197***	0.020**	-0.009	-0.001	0.002
	(0.000)	(0.000)	(0.000)	(0.003)	(0.159)	(0.838)	(0.733)
(2)-(1)	-0.017*	0.015	0.004	-0.010	-0.001	-0.001	-0.011
	(0.018)	(0.058)	(0.594)	(0.148)	(0.910)	(0.869)	(0.084)
(4)-(3)	-0.010	-0.003	0.026*	-0.000	0.002	-0.009	0.006
	(0.140)	(0.758)	(0.030)	(0.958)	(0.816)	(0.129)	(0.309)

Notes: This table reports quarterly equal weighted buy and hold adjusted return for portfolios double sorted based on target price revisions and institutional herding. The quarterly equal weighted adjusted buy and hold abnormal return of each stock is calculated using DGTW (1997) characteristics-based benchmark portfolio return. For each quarter, stocks are divided to upgrade and downgrade depending on target price revisions. Within each upgrade or downgrade group, stocks are divided based on their BHM_{it} or SHM_{it} measures. For each subgroup of the four subgroups, five portfolios were constructed. The first part of the panel shows the time series quarterly abnormal return of the extreme portfolios along with their p values. The second part of the panel shows the differences between extreme portfolios. Time series p value are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6-9: Abnormal returns of short-term institutional herding and target price revisions portfolios

Portfolios	Qt-2	Qt-1	Qt	Qt+1	Qt+2	Qt+3	Qt+4
Downgrade strong sell (1)	-0.024*** (0.000)	-0.070*** (0.000)	-0.099*** (0.000)	-0.013*** (0.006)	-0.012** (0.021)	-0.002 (0.616)	-0.003 (0.614)
Downgrade strong buy (2)	-0.015** (0.014)	-0.040*** (0.000)	-0.103*** (0.000)	-0.016*** (0.005)	-0.003 (0.508)	-0.010* (0.057)	-0.012** (0.035)
Upgrade strong sell (3)	0.011** (0.023)	0.043*** (0.000)	0.054*** (0.000)	0.002 (0.646)	-0.004 (0.404)	-0.003 (0.359)	-0.012** (0.010)
Upgrade strong buy (4)	0.027*** (0.000)	0.086*** (0.000)	0.126*** (0.000)	0.006 (0.160)	-0.004 (0.317)	-0.011** (0.031)	-0.005 (0.276)
Test of differences							
Portfolios	Qt-2	Qt-1	Qt	Qt+1	Qt+2	Qt+3	Qt+4
(3)-(1)	0.035*** (0.000)	0.112*** (0.000)	0.153*** (0.000)	0.015* (0.017)	0.008 (0.238)	-0.001 (0.819)	-0.010 (0.178)
(4)-(2)	0.042*** (0.000)	0.125*** (0.000)	0.229*** (0.000)	0.022** (0.002)	-0.001 (0.919)	-0.001 (0.897)	0.007 (0.310)
(2)-(1)	0.009 (0.240)	0.030*** (0.000)	-0.004 (0.634)	-0.004 (0.613)	0.008 (0.226)	-0.008 (0.216)	-0.009 (0.234)
(4)-(3)	0.016* (0.012)	0.043*** (0.000)	0.072*** (0.000)	0.004 (0.495)	-0.000 (0.985)	-0.008 (0.198)	0.008 (0.235)

Notes: This table reports quarterly equal weighted buy and hold adjusted return for portfolios double sorted based on target price revisions and short-term institutional herding. The quarterly equal weighted adjusted buy and hold abnormal return of each stock is calculated using DGTW (1997) characteristics-based benchmark portfolio return. For each quarter, stocks are divided to upgrade and downgrade depending on target price revisions. Within each upgrade or downgrade group, stocks are divided based on their BHM_{it} or SHM_{it} measures. For each subgroup of the four subgroups, five portfolios were constructed. The first part of the panel shows the time series quarterly abnormal return of the extreme portfolios along with their p values. The second part of the panel shows the differences between extreme portfolios. Time series p value are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6-10: Abnormal returns and long-term institutional herding based on target prices portfolios

Portfolios	Qt-2	Qt-1	Qt	Qt+1	Qt+2	Qt+3	Qt+4
Downgrade strong sell (1)	-0.017*** (0.003)	-0.074*** (0.000)	-0.103*** (0.000)	-0.019*** (0.002)	-0.009* (0.065)	-0.010* (0.051)	-0.004 (0.462)
Downgrade strong buy (2)	-0.019*** (0.002)	-0.063*** (0.000)	-0.077*** (0.000)	-0.012*** (0.006)	-0.012** (0.031)	-0.011** (0.045)	-0.004 (0.381)
Upgrade strong sell (3)	0.024*** (0.000)	0.055*** (0.000)	0.070*** (0.000)	0.004 (0.322)	0.001 (0.911)	-0.004 (0.281)	-0.007 (0.134)
Upgrade strong buy (4)	0.013** (0.021)	0.037*** (0.000)	0.081*** (0.000)	0.003 (0.409)	-0.005 (0.292)	-0.008** (0.045)	-0.008* (0.088)
Test of differences							
Portfolios	Qt-2	Qt-1	Qt	Qt+1	Qt+2	Qt+3	Qt+4
(3)-(1)	0.041*** (0.000)	0.129*** (0.000)	0.173*** (0.000)	0.023** (0.002)	0.009 (0.157)	0.006 (0.340)	-0.003 (0.644)
(4)-(2)	0.032*** (0.000)	0.100*** (0.000)	0.158*** (0.000)	0.015** (0.007)	0.007 (0.346)	0.003 (0.677)	-0.004 (0.500)
(2)-(1)	-0.002 (0.754)	0.011 (0.190)	0.026** (0.005)	0.007 (0.334)	-0.003 (0.675)	-0.001 (0.940)	-0.000 (0.966)
(4)-(3)	-0.012 (0.105)	-0.019* (0.035)	0.011 (0.425)	-0.001 (0.789)	-0.006 (0.400)	-0.004 (0.473)	-0.002 (0.802)

Notes: This table reports quarterly equal weighted buy and hold adjusted return for portfolios double sorted based on target price revisions and long-term institutional investors herding. The quarterly equal weighted adjusted buy and hold abnormal return of each stock is calculated using DGTW (1997) characteristics-based benchmark portfolio return. For each quarter, stocks are divided to upgrade and downgrade depending on target price revisions. Within each upgrade or downgrade group, stocks are divided based on their BHM_{it} or SHM_{it} measures. For each subgroup of the four subgroups, five portfolios were constructed. The first part of the panel shows the time series quarterly abnormal return of the extreme portfolios along with their p values. The second part of the panel shows the differences between extreme portfolios. Time series p value are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

6.5.4 Future Returns of Institutional Investors Herding following Target Prices

In order to explain the main reasons behind the herding and to test the third and fourth hypotheses, I estimate cross-sectional regressions of future adjusted stock return on

institutional herding measure in table 6-11. Following Brown et al. (2014) and Yüksel (2015), I regress adjusted stock returns in the subsequent quarter and subsequent year to test the impact of institutional herding behaviour on the stock prices. By doing so, I test the impact of herding behaviour motivated by target price revisions. If target price revisions contain useful information to institutional investors, it should move the prices toward the fundamental value. Yet, if institutional investors follow these signals to look prudent or for reputational concerns, this behaviour should have a negative impact on stock prices.

Table 6-11 shows the results for all, short- and long-term institutional investors. The results confirm the earlier results in the portfolio analyses and show that both the adjusted herding and the level of herding explained by target prices both pushed the prices up toward the fundamental values in the subsequent quarter (Wermers, 2003).

The coefficients of changes in target price revisions are significant for all types of institutional investors in the subsequent quarter. The coefficient of adjusted herding is significant for all types of institutional investors in the subsequent quarter but not for the subsequent year. More importantly, the interaction term between target price revisions and short-term institutional herding in the subsequent quarter is positive and significant to all types of institutional investors. It can be inferred from the latter results that the herding behaviour of all types of institutional investors positively impact the stock prices. The results in this section challenge both Lin et al. (2016) and Yüksel (2015). There is no return continuation as the institutional investors expected to incorporate the information implied in analysts' forecasts in the subsequent quarter as analyst's outputs is short-lived information. It can be inferred from Table 6-11 that institutional herding

in responding to target price revisions is investigative meaning that institutional investors are following the information rather than following each other.

Table 6-11: Regression of future returns on institutional herding and analysts' target price revisions

VARIABLES	Ret $_{t:t+1}$			Ret $_{t:t+4}$		
	(1)	(2)	(3)	(4)	(5)	(6)
ΔTP_{it}	0.650***	0.642***	0.655***	0.130***	0.130***	0.132***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ADJ- Ttl_{it}	0.027***			-0.004		
	(0.000)			(0.677)		
ADJ- $Ttl_{it} \times \Delta TP_{it}$	0.326***			0.036		
	(0.000)			(0.457)		
ADJ-$Shrt_{it}$		0.024***			-0.003	
		(0.000)			(0.774)	
ADJ-$Shrt_{it} \times \Delta TP_{it}$		0.440***			0.034	
		(0.000)			(0.588)	
ADJ- Lng_{it}			0.036***			-0.003
			(0.000)			(0.760)
ADJ- $Lng_{it} \times \Delta TP_{it}$			0.096***			0.064
			(0.000)			(0.196)
Constant	-0.103***	-0.104***	-0.100***	0.359***	0.359***	0.358***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	65,690	65,690	65,690	65,690	65,690	65,690
Unreported Controls	YES	YES	YES	YES	YES	YES
Time Effect	YES	YES	YES	YES	YES	YES
Industry Effect	YES	YES	YES	YES	YES	YES
R-squared	0.352	0.352	0.348	0.037	0.037	0.037
Adj. R-squared	0.351	0.351	0.348	0.036	0.036	0.036

This table presents the regression results of subsequent quarter and subsequent year return on institutional herding, analysts' outputs and other control variables. Two-tailed p-values are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are adjusted for firm-level clustering and are robust to heteroscedasticity and autocorrelation. See Table 6-3 for variable definitions.

Since the short-term investors might exploit the information in the near future and negatively impact the stock prices in the long-run (Bushee, 1998), I extend the analyses and investigate whether institutional herding cause reversals in the long-run. Dasgupta et al. (2011) show that the persistence of institutional herding predicts a reversal in stock returns over the eight quarters following portfolio formation. Thus, I test whether the herding behaviour induces by target price revision negatively impact the stock prices

over the four to eight quarters and four to twelve quarters subsequent to the target price revisions. In an unreported test, I examine the price impact over a longer horizon to test whether institutional investors' herding based on analysts' target price revisions cause return reversals. However, I failed to find any evidence of reversals over the four quarters or eight quarters following the period covered. The results show that none of the variables is significant in the long run. This is expected due to the short-term nature of the analysts' forecasts, in general, including the target prices. Thus, institutional investors' herding based on target prices is spurious and they are responding to the same information at the same time.

6.5.5 Alternative Measure of Herding

In a further robustness check, I replace the adjusted herding measure (ADJ_{it}) with buy-side herding (BHM_{it}) and sell-side herding (SHM_{it}) and repeat all of the analyses using these measures. The results are qualitatively similar to Table 6-6. Specifically, columns 1 and 2 in Table 6-12 show that the coefficient of target price revisions is significantly negative for (SHM_{it}) but not for BHM_{it}. I next separate institutional investors by their investment horizon following Yan and Zhang (2009). The results for short-term institutional investors (columns 3 and 4) show that short-term institutional investors herd in both sides as the coefficient of changes in target prices is significant for both BHM_{it} and SHM_{it}.

Table 6-12: Regression of institutional investors' buy-side herding and sell-side herding on target price revision

VARIABLES	BHM-Ttl$_{it}$ (1)	BHM-Shrt$_{it}$ (2)	BHM-Lng$_{it}$ (3)	SHM-Ttl$_{it}$ (4)	SHM-Shrt$_{it}$ (5)	SHM-Lng$_{it}$ (6)
ΔTP_{it}	0.002	0.032***	0.005	-0.012***	-0.006**	-0.013***
	(0.673)	(0.000)	(0.267)	(0.000)	(0.025)	(0.001)
ΔREC_{it}	-0.000	-0.001	-0.001	0.000	-0.001	0.001
	(0.594)	(0.257)	(0.542)	(0.998)	(0.307)	(0.458)
ΔEPS_{it}	0.001	0.002***	0.001	0.001**	0.001	0.002*
	(0.363)	(0.001)	(0.303)	(0.033)	(0.217)	(0.054)
RET_{it-1}	-0.001	0.013***	-0.012***	-0.019***	-0.017***	-0.011***
	(0.643)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$RET_{it-4,it-2}$	-0.010***	-0.003***	-0.006***	-0.011***	-0.002***	-0.013***
	(0.000)	(0.004)	(0.000)	(0.000)	(0.009)	(0.000)
SUE_{it}	-0.000	0.000	-0.000	-0.000***	-0.000**	-0.000*
	(0.178)	(0.135)	(0.922)	(0.005)	(0.021)	(0.095)
$SPindex_{it}$	0.004*	0.001	0.007***	-0.000	0.003*	-0.003
	(0.082)	(0.629)	(0.009)	(0.928)	(0.060)	(0.215)
$LOG(MV_{it})$	-0.004***	-0.002***	0.006***	0.005***	0.001***	0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
$LOG(BM_{it})$	0.003**	-0.000	-0.001	0.002***	0.003***	0.005***
	(0.029)	(0.948)	(0.495)	(0.009)	(0.000)	(0.000)
VOL_{it}	-0.824***	0.026	-0.592***	0.298***	-0.049	0.681***
	(0.000)	(0.541)	(0.000)	(0.000)	(0.311)	(0.000)
$Turn_{it}$	0.077***	0.020***	-0.005	-0.082***	-0.045***	-0.053***
	(0.000)	(0.000)	(0.259)	(0.000)	(0.000)	(0.000)
Constant	0.162***	0.056***	-0.033**	-0.050***	0.013	-0.182***
	(0.000)	(0.000)	(0.025)	(0.000)	(0.111)	(0.000)
Observations	29,581	31,026	31,275	36,109	34,664	34,415
Time Effect	YES	YES	YES	YES	YES	YES
Industry Effect	YES	YES	YES	YES	YES	YES
R-squared	0.034	0.026	0.033	0.078	0.025	0.050
Adj. R-squared	0.032	0.024	0.031	0.076	0.024	0.048

Notes: This table presents the regression results of the institutional investors buy-side herding (BHM_{it}) and sell-side herding (SHM_{it}) on the consensus target prices revision (ΔTP_{it}) and other determinates of institutional herding. Standard errors are adjusted for firm-level clustering, and are robust to heteroscedasticity and autocorrelation. Two-tailed p-values are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. See Table 6-3 for variable definitions

To test the impact of institutional investors' buy- and sell-side herding separately on stock prices in the short-run, I estimate cross-sectional regressions of future stock returns on institutional buy- and sell-side herding. Table 6-13 and Table 6-14 confirm that there is no evidence of reversal in the short-run. In addition, and consistent with Table 6-11, I observe a significant positive effect for buy-herding stocks in the abnormal returns in the subsequent quarter and subsequent year. Also, I observe a significantly

negative effect for sell-herding stocks. This finding is consistent with the initial finding in Table 6-11 and it indicates a positive impact of institutional herding following target price revisions.[31]

Table 6-13: Regression of one-quarter returns on institutional herding and analysts' target price revisions

	Ret $_{t:t+1}$					
	(1)	(2)	(3)	(4)	(5)	(6)
ΔTP_{it}	0.714***	0.699***	0.696***	0.606***	0.568***	0.622***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BHM-Ttl$_{it}$	-0.004					
	(0.666)					
BHM-Ttl$_{it}$ × ΔTP_{it}	0.226***					
	(0.000)					
BHM-Shrt$_{it}$		0.112***				
		(0.000)				
BHM-Shrt$_{it}$ × ΔTP_{it}		0.476***				
		(0.000)				
BHM-Lng$_{it}$			0.045***			
			(0.000)			
BHM-Lng$_{it}$ × ΔTP_{it}			-0.062			
			(0.331)			
SHM-Ttl$_{it}$				-0.114***		
				(0.000)		
SHM-Ttl$_{it}$ × ΔTP_{it}				-0.886***		
				(0.000)		
SHM-Shrt$_{it}$					-0.040***	
					(0.003)	
SHM-Shrt$_{it}$ × ΔTP_{it}					-0.602***	
					(0.000)	
SHM-Lng$_{it}$						-0.074***
						(0.000)
SHM-Lng$_{it}$ × ΔTP_{it}						-0.161**
						(0.020)
Constant	-0.032*	-0.067***	-0.021	-0.164***	-0.120***	-0.188***
	(0.095)	(0.000)	(0.235)	(0.000)	(0.000)	(0.000)
Observations	29,581	31,026	31,275	36,109	34,664	34,415
Unreported control	YES	YES	YES	YES	YES	YES
Time Effect	YES	YES	YES	YES	YES	YES
Industry Effect	YES	YES	YES	YES	YES	YES
R-squared	0.406	0.404	0.371	0.301	0.290	0.332
Adj. R-squared	0.405	0.403	0.369	0.300	0.288	0.331

This table presents the regression results of one quarter ahead return on institutional investors buy-side herding and sell-side herding, analysts' outputs and other control variables. Two-tailed p-values are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are adjusted for firm-level clustering and are robust to heteroscedasticity and autocorrelation. See Table 6-3 for variable definitions.

[31] In unreported analyses, I test the impact of institutional herding following target price revisions on the long-run return, none of the coefficients were significant.

Table 6-14: Regression of one-year ahead returns on institutional herding and analysts' target price revisions

	Ret $_{t:t+4}$					
	(1)	(2)	(3)	(4)	(5)	(6)
ΔTP_{it}	0.153***	0.111***	0.101***	0.104***	0.120***	0.140***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BHM-Ttl$_{it}$	-0.013					
	(0.593)					
BHM-Ttl$_{it}$ ×ΔTP_{it}	-0.099					
	(0.440)					
BHM-Shrt$_{it}$		-0.050				
		(0.231)				
BHM-Shrt$_{it}$ ×ΔTP_{it}		0.633***				
		(0.002)				
BHM-Lng$_{it}$			-0.010			
			(0.642)			
BHM-Lng$_{it}$ ×ΔTP_{it}			0.348***			
			(0.006)			
SHM-Ttl$_{it}$				0.016		
				(0.696)		
SHM-Ttl$_{it}$ ×ΔTP_{it}				0.246		
				(0.289)		
SHM-Shrt$_{it}$					-0.001	
					(0.982)	
SHM-Shrt$_{it}$ ×ΔTP_{it}					0.341	
					(0.167)	
SHM-Lng$_{it}$						0.030
						(0.230)
SHM-Lng$_{it}$ ×ΔTP_{it}						-0.017
						(0.907)
Constant	0.382***	0.434***	0.376***	0.354***	0.318***	0.356***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	29,581	31,026	31,275	36,109	34,664	34,415
Unreported control	YES	YES	YES	YES	YES	YES
Time Effect	YES	YES	YES	YES	YES	YES
Industry Effect	YES	YES	YES	YES	YES	YES
R-squared	0.043	0.044	0.042	0.034	0.033	0.035
Adj. R-squared	0.041	0.042	0.040	0.032	0.031	0.033

This table presents the regression results of four quarters ahead return on institutional investors buy-side herding and sell-side herding, analysts' outputs and other control variables. Two-tailed p-values are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are adjusted for firm-level clustering and are robust to heteroscedasticity and autocorrelation. See Table 6-3 for variable definitions.

6.6 Conclusion

Lin et al. (2016) propose that institutional investors are naively overreacting following the target prices revisions to look prudent; thus, their trading based on target price

revisions is not profitable. The lack of target price revisions' profitability for institutional trading is surprising, particularly in the presence of well-documented evidence of its profitability. I, therefore, directly examined whether institutional investors herd when using target price revisions and, more importantly, the price impact of such behaviour.

Using 65,690 firm quarter observations in the period between 2003 and 2013, I found robust evidence that institutional investors herd using the analysts' target price revisions. After disaggregating institutional herding based on investment horizon, I showed that herding using target prices is driven by short-term institutional investors. After splitting the revisions into upgrades and downgrades, the results show that only short-term institutional investors react to both upgrades and downgrades as informed users. More importantly, I found no evidence of a negative impact of overall, short- and long-term institutional investors' herding. Moreover, I observed a positive impact of such behaviour in the subsequent quarter return. I can infer from the last results that institutional investors' herding is due responding to the same information at the same time (investigative herding). The results in this chapter reveal that institutional investors' herding seems to be "spurious" as the herding proxy captures an investigative herding.

7 Conclusion

7.1 Background to the Thesis

While institutional investors have their in-house research teams, there is consistent evidence in the literature that they value sell-side analysts' research. This thesis sheds light on the usefulness of two types of analysts' outputs to institutional investors. By doing so, this thesis focuses on the informational role that sell-side analysts play in the capital market by promoting price discovery in the capital market. This thesis examines the post-regulation period where analysts and institutional investors could no longer receive material information before other parties in the financial market (Kothari et al., 2016). Therefore, it is crucial to understand the impact of the interaction between both sides on the stock prices.

This thesis focuses on cash flow forecasts and target prices which has attracted relatively less academic attention compared with stock recommendations and earnings forecasts (Bradshaw, 2011). This thesis also examines multiple analysts' forecasts simultaneously in response to Bradshaw (2011) as this approach will give more conclusive evidence on the usefulness of analysts' outputs. In particular, Bradshaw mentioned in a critical discussion of sell-side analysts' work that:

> "*The trend towards research that simultaneously considers multiple analyst outputs is a step in the right direction if our goal is to increase our knowledge of analysts using large sample databases"* (Bradshaw, 2011, p. 32).

To examine the usefulness of analysts' forecasts to institutional investors, this thesis aimed to provide answers to three research questions: First, do cash flow forecasts contain incremental information to institutional investors? Second, when analysts talk do foreign institutional investors listen? Third, do institutional investors herd when using target prices revisions?

7.2 Summary of Findings

7.2.1 Do Cash Flow Forecasts Contain Incremental Information to Institutional Trading Behaviour?

Chapter 4 provides evidence that the presence of cash flow forecasts accompanied with earnings forecasts provide institutional investors with useful information to forecasts accruals. This chapter also provides evidence that institutional investors respond to cash flow forecast revisions above and beyond earnings forecasts, stock recommendations and target prices. Moreover, I have shown that different types of institutional investors, based on their investment horizon, respond differently to the presence of cash flow forecasts and cash flow forecasts revisions.

The main findings of this chapter show that the presence of cash flow forecasts tempers institutional investors' response to earnings revisions and that institutional investors' trade in the direction of cash flow forecast revisions. Crucially, after splitting institutional traders into short-term and long-term investors, I find that only short-term institutional investors adjust their trading in response to cash flow forecast revision. These results hold after controlling for other analyst outputs and other factors relating to institutional trading, and after controlling for sample selection bias. Overall, it can be

inferred that analysts' cash flow forecasts contain incrementally useful information, and that this information affects the trading of institutional investors.

By examining institutional investors' response to analysts' cash flow forecasts, I directly contribute to the debate surrounding the usefulness of cash flow forecasts. Institutional investors are viewed as more informed users and, therefore, are more likely to be able to process any incremental information contained in the disclosure of cash flow forecasts. Hence, providing evidence of the institutional investors' response to the cash flow forecasts is direct evidence of the usefulness of cash flow forecasts.

7.2.2 When Analysts Talk, Do Foreign Institutional Investors Listen?

In Chapter 5, I shed a light on a unique type of institutional investor who has been rarely examined in the analyst context. In particular, Chapter 6 examines whether foreign institutional investors who are located outside the U.S. would benefit from sell-side analysts' forecasts. I find a positive and significant increase in foreign institutional ownership in response to a positive change in analysts' target prices, which leads to positive future abnormal returns. These results hold after controlling for a set of comprehensive factors that impact institutional trading.

Overall, I provide evidence that analysts play a crucial role in disseminating information to different types of market participants such as foreign institutional investors. More importantly, I have shown that foreign institutional trading based on analysts target prices, promotes price discovery. Therefore, this chapter has strong

implications for enhancing the overall knowledge in how foreign institutional investors can perform better in the capital market.

7.2.3 Do Institutional Investors Herd Following Analysts' Target Price Revisions

Chapter 6 examines the herding behaviour of institutional investors in responding to target price revisions. By doing so, this chapter contributes to resolving the surprising results of Lin et al. (2016) that institutional investors' response to target prices is not profitable. Hence, it provides evidence on whether the interaction between institutional investors and analysts – as two of most informed users of financial information – promote price discovery or harm stock prices in the short- and long-run. Chapter 5 further explores whether different types of institutional investors use information provided by analysts in different ways.

The results in Chapter 6 show that institutional investors do herd when using target prices. This relationship remains significant after controlling for other analysts' output and stock characteristics which might affect the herding behaviour of institutional investors. After splitting the institutional investors based on their investment horizon, I find that only short-term institutional investors herd following the target prices upgrades and downgrades. Nevertheless, the herding behaviour of neither short- nor long-term institutional investors destabilise the stock prices. In contrast, the herding behaviour of short-term institutional investors explained by target price revisions have a positive impact on the subsequent stock returns. Therefore, Chapter 6 provides evidence that short-term institutional investors move the stock prices toward fundamental value in the near future.

7.3 Limitations

The main limitation of this thesis is the use of 13F data. While 13F is the largest databased that covers institutional investors' ownership, it has several limitations. First, some institutions are treated confidentially, and thus their holdings are not listed in the Thomson Reuters/WRDS 13F data. Second, small institutions with holdings of less than $100 million are not available. Third, 13F institutional investment managers do not report the short-selling of equity stocks (Lewellen, 2011). Fourth, the changes in quarterly holdings data provided by 13F do not consider intra-quarter transactions. More importantly, using 13F data I cannot identify the exact timing or execution price of trades.

Finally, 13F data provided by Thomson Reuters through Wharton Research Data Service (WRDS) after June 2013 had serious issues, summarised by WRDS in three main points. First: Some of the institutional investors were omitted or inaccurately reported in the period after June 2013. Second, securities as large as Apple disappeared from the database. WRDS mentioned that this bias can be estimated as 15% of U.S. equity market. Lastly, there is inconsistency in the number of shares held by institutional investors surrounding the dates where share splits occurred. Therefore, extending the analyses beyond 2013 was hard due to the bias in the 13F data.[32]

[32] 13F has updated this data in June 2018. Yet, the empirical analyses of this thesis were completed by that time and updating the whole chapters was not applicable at this point.

7.4 Policy Implications and Direction for Further Research

The empirical findings of this thesis debates involving the frequency of disclosure for institutional investors. In the past, the Securities and Exchange Commission (SEC) considered petitions that would require more frequent disclosure for mutual funds and other institutional investors (e.g., Wermers, 2001, Puckett and Yan, 2011).

Moreover, the findings of Chapter 5 have strong economic implications, as I have shown consistent evidence that foreign institutional investors can alleviate their information disadvantage, as documented by Baik et al. (2013), by listening to analysts target prices. Therefore, directing foreign institutional investors to follow analysts target prices will help them improve their performance in the U.S. equity market.

The analyses presented in the current thesis lead to the identification of a number of potential studies for future research. First, the analyses presented in Chapter 4 and Chapter 6 can be extended by using high frequency trading data such as data provided by TAQ and Abel Noser (ANcerno) Data. The analyses of Chapter 5 can be extended internationally; i.e., the usefulness of analysts' outputs to foreign institutional investors can be extended using the Factset Lionshares database to test whether institutional investors in general, and foreign institutional investors, benefit from analysts' forecasts in different contexts. While the role the analysts play in the U.S. equity market has been examined, their role worldwide is largely unexplored.

A direction for future research could also be focusing on the usefulness of analysts' forecasts to individual investors on the post-regulation period. While early studies such as Mikhail et al. (2007) and Malmendier and Shanthikumar (2007) evidenced that

individual investors are naïve in responding to analysts' forecasts and, therefore, they do not benefit from trading based on analysts' forecasts, this relationship should be re-visited in the post-regulation period. This is crucial as the regulations were approved to increase the objectivity of analysts, return confidence to the capital market, and protect small investors like individual investors. Future studies can also focus on other supplementary forecasts such as revenue and dividend forecasts.

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