

Trading Responses to Analyst Reports by Investor Types*

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Abstract

Using the Korean equity market data which is characterized by a high proportion of trading activities attributable to individual investors as well as foreign investors, this paper investigates whether there is any difference in trading behaviors across investor types following the publication of analyst reports. We also examine the determinants of the trading responses to analyst reports across investor types where we use the influence of firm characteristics as well as analyst characteristics as the determinants of the announcement date trading volumes. Our findings are as follows. First, individual investors are the most responsive investor group to the analyst reports. In particular, individual investors respond to information on small to medium cap firms as well as optimistic forecasts. They tend to overreact to forward looking information confirming the belief that they are unsophisticated showing limited investment rationality. Second, institutional investors increase trading volumes for neglected firms characterized by large information asymmetry and firms with high volatility. The increase in trading volume by institutional investors occurs prior to the analyst report publication date, suggesting that institutional investors are informed traders. Third, foreign investors do not show meaningful responses to research reports by local analysts suggesting that foreign investors do not have a great deal of trust in the information provided by local analysts. Finally, unlike the results based on the US markets the informativeness of analyst reports decreases as the cost of information supply increases, leading to the conclusion that the research analysts act primarily as information transmitter repackaging disclosed information in the Korean market.

Keywords: informativeness of analyst reports, trading behaviors, institutional investors, individual investors, informed traders

EMF Classification Code: 210

1. Introduction

Investor types which differ in information asymmetry and rationality may show different trading responses to analyst reports. This may be particularly relevant in a market characterized by a high proportion of trading activities attributable to individual investor. While most of the existing studies investigate the informativeness of the consensus forecast, the focus of this study is to measure the average trading volume response on the publication date of the analyst reports by investor types and analyze the determinants of the trading volume response by investor types. More specifically, we divide investors into three classes of investors, who actively participate in the Korean stock market, namely, individual investors, institutional investors and foreign investors and examine whether the trading responses to analyst reports varies across investor types and how firm characteristics and analysts characteristics influence the trading volumes on the announcement date across investor types.

There are competing hypotheses on the role of analysts in the capital market, motivation for information provision by analysts, the impact of analyst research on stock price as discussed by Frankel et al. (2006). Regulators and market participants generally hold the view that analyst reports on average reduce the information asymmetry that exists between firms and investors and enhances the efficiency of the market. Some studies such as Lys and Sohn (1990) and Francis and Soffer (1997) document that by and large analyst reports convey value-related information to the market. Furthermore, Hong et al. (2000) and Elgers et al. (2001) report that as analyst activity increases the speed with which public information is impounded in stock price increases. Brennan and Subramanyam (1995) claim that analyst activity reduces the adverse selection cost in stock trading as well as information asymmetry.

On the other hand, there exist studies that find analyst reports do not provide value relevant information to investors. There are at least three factors that reduce the informativeness of analyst reports. First, Irvine (2000), Lin and McNichols (1998), and Cowen et al. (2005) among others point out that analysts have the incentive to enhance the

profitability of brokerage firms they work for. Next, Bhushan (1989b), Francis et al. (2002), and Frankel and Li (2004) among others argue that the increase in the timeliness of voluntary financial disclosure replaces the usefulness of the information partially. Third, according to Lin and McNichols (1998), Michaely and Womack (1999), Dechow et al. (2000), and O'Brien et al. (2003), conflicts of interest that arise because analysts have private objectives lead analysts to become optimistically biased.

As there are conflicting hypotheses on analyst reports prior studies investigate informativeness of analyst reports by examining the factors that influence the informativeness of analyst reports. A large number of studies analyze determinants of informativeness of analyst reports using analyst following as well as earnings forecast accuracy as proxies of informativeness. However, for the analyst following to be a good proxy of informativeness, we have to assume that analyst following automatically increases for firms about which there are lots of information while for earnings forecast accuracy to be a good proxy of informativeness we have to assume that the more accurate earnings forecast is, the greater is the impact it has on the stock price. For this reason, Frankel et al. (2006) use the stock price response to analyst reports directly rather than using proxies since investors are the demanders of information. Using the US data they measure the informativeness of analyst reports by the size of the average abnormal return on the publication dates of the analyst reports on an individual firm, and then analyze the determinants of the informativeness of analyst reports. Frankel et al. (2006) report that the informativeness of analyst reports decreases as information acquisition costs rise and increases as the competition among the analysts intensifies. Furthermore, by examining the marginal effect that a wide range of factors have on the stock price response they show the determinants of the informativeness of analyst reports as well as the role of analysts. Following Frankel et al. (2006) we investigate the informativeness of analyst reports using the average market response on the publication dates of the analyst reports.

However, this study differs from the previous studies in the following aspects. First, we study the trading responses to analyst reports in a market characterized by the dominance of individual investors, which the Korean market is. According to Marhfor et al. (2010) who

compare the effect of analyst coverage on the stock price by countries, whereas the analyst coverage has a positive influence on the stock price in the US and developed markets where the weight of the institutional investors is high and the disclosure regulation is strict, the analyst coverage has a little effect on the stock price in emerging markets where the weight of the institutional investors is low and the disclosure regulation is lax since analysts act as information intermediaries. Emerging markets like Korean market often exhibit the characteristic that the relative importance of institutional investors is low and the relative importance of individual investors is high.

In addition, since emerging markets present economic environments where foreign investors exert greater influence on the market than in the US and developed markets, there may be a different motivation for information provision in emerging markets than in developed markets. That is, in developed markets where the weight of institutional investors is high the increase in the trading activity of institutional investors contributes to the profits of brokerage firms, analysts may develop economic motivations to offer differentiated reports that satisfy informational needs of institutional investors. In contrast, in emerging markets where the weight of individual investors who exhibit irrational behaviors is high analysts may concentrate information provision on firms about which it costs little to produce information while leading to greater trading activities. Therefore, our study which examines the information effect of analyst reports in the Korean market, which is an emerging market, sheds light on the effect of information environment on the usefulness of analyst reports.

Second, we measure the trading responses to analyst reports by investor types (institutions, individuals and foreigners), then analyze whether there is any difference in determinants of the trading responses by investor types. Frankel et al. (2006) measure the informativeness of analyst reports by the size of the change in the expectation of the firm value by market participants (the absolute value of average abnormal returns). However, due to differences in the degree of information asymmetry and investment rationality different investor types may perceive the informativeness of the same analyst reports differently. For this reason, we examine whether individual investors, institutional investors, and foreign investors perceive the informativeness of analyst reports differently and exhibit different

trading behaviors. Because of the wide spread belief that in the Korean market three investor types (institutions, individuals and foreigners) exhibit different trading behaviors, the Korea Exchange discloses daily trading volumes. Therefore we extend the study of Frankel et al. (2006) by measuring the informativeness of analyst reports using the trading volume by investor types and analyze the determinants the informativeness of analyst reports.

Lastly, we divide factors that influence the investor responses to analyst reports into firm characteristics and analyst consensus forecast factors. Bhushan (1989) and Frankel et al. (2006) postulate that the informativeness of analyst reports is an increasing function of informational demands of market participants and a decreasing function of informational production costs faced by analysts. Hence, they infer the role of analysts in the market by investigating whether firm characteristics, which can influence both the informational demands and the information production costs, have a positive or negative marginal effect on the proxy of informativeness. We also analyze the marginal effect on the trading responses of firm characteristics, which can influence both the informational demands and the information production costs, by investor types. In addition, we analyze the effect of analyst forecast characteristics such as target price and stock recommendation on trading responses by investor type. The conflict of interest by analysts may reduce the accuracy of the information which analysts provide. Especially, because of information asymmetry between individual investors and institutional investors there may be differences in trading responses to the target price and investment recommendation. Therefore, we examine whether investors show different trading behaviors given characteristics of analyst forecast information such as target price deviation, target price volatility, investment recommendation score, volatility of investment recommendation score.

We sample the firms listed in the main board of the Korea Exchange for which there is at least one published report by analysts from local brokerage firms for the 2005-2009 period. The sample consists of 1,225 firms. We measure the average market response on the analyst report publication dates by firm-year then analyze its determinants. The findings are as follows. First, the investors who exert the greatest influence on the stock price and trading volumes on the analyst report publication dates are individuals while foreigners exert little

influence. Second, as shown in the relationship between firm characteristics and the measure of the informativeness of the analyst reports, institutional investors show a positive relationship with the return volatility while showing a negative relationship with firm size, the number of analyst reports and leverage ratios. On the other hand, trading responses of individual investors show a negative relationship with the number of analyst reports, market comovement, advertising expenses, leverage ratios while showing a positive relationship with equity ownership of insiders, number of firms in a given industry and good news. In contrast, trading responses of foreign investors do not reveal any statistically significant relationship. Third, from the relationship between the analyst forecast characteristics and the trading responses by investor types we find that trading volumes of institutional investors increase on the analyst report publication dates for firms for which the target price is higher than the current price and there is a frequent target price revision. The trading volumes of individual investors increase with the target stock price and the strength of the stock recommendation. The trading volumes of individual investors increase more the greater is the dispersion in the opinions of analysts on target stock price. The trading volumes of foreign investors do not show statistically significant increases to analyst forecasts.

Overall, the determinants of the informativeness of the analyst reports we find for the Korean market are different from those that Frankel et al. (2006) find for the US market. In the US market, the informativeness of the analyst reports by and large increases where demand for information increases while in the Korean market the informativeness of the analyst reports is found mostly where cost of information provision is lowest. We attribute this difference to the fact that individual investors overreact to analyst reports and analysts are motivated to increase trading volume at low information provision costs.

This paper is organized as follows. Following the introduction in section 1, section 2 reviews the literature on the informativeness of analyst reports. Section 3 explains the variables used in the regression analyses and section 4 explains measurement methods and research models. Section 5 discusses the empirical results of proposed models. Finally, section 6 presents summary and conclusions.

2. Literature Review

Prior research explains the role of analysts from two perspectives. First, analysts play the role of private information providers who acquire private information on the fundamentals of the firm and convey to the market value-related forecasts. Second, analysts play the role of an information intermediary who simply transmits to market participants disclosed information on behalf of the firm's management rather than competing with the firm for firm-related information sources (Lang and Lundholm, 1996). Since the informativeness of analyst reports (AI) may depend on the role analysts play in the capital markets, some studies analyze the determinants of AI in order to infer the role of analysts in the capital markets.

Studies on the determinants of AI can be divided into those that take the perspectives of information provider and those that take the perspectives of information demander. Studies on the determinants of AI that take the perspectives of information provider use analyst following as a proxy for AI (Bhushan, 1989; O'Brian and Bhushan, 1990; Lang and Lundholm, 1996; McNichals and O'Brian, 1997; Alford and Berger, 1999). Bhushan (1989) proposes that, as analyst following increases in information demand and decreases in information provision costs, the equilibrium number of analysts obtains at the intersection between demand curve of analysts service and supply curve of analysts service. Since analysts research firms about which there exists valuable information Bhushan (1989) posits that AI increases in analysts following. In addition, he examines firm characteristics that influence analysts service demand and supply and investigate their marginal effects. Informativeness of analyst reports is an increasing function of informational demands of market participants and a decreasing function of informational production costs faced by analysts. Hence, they infer the role of analysts in the market by investigating whether firm characteristics, which can influence both the informational demands and the information production costs, have a positive or negative marginal effect on the proxy of informativeness.

On the other hand, Frankel et al. (2006) analyze the determinants of AI using market response by information demanders instead of using a proxy. They interpret a larger market

response (the absolute value of the abnormal return) on the release dates of analyst reports as analyst reports being more informative and analyze various factors that have an influence on the market responses to analyst reports. They report that the market responses to analyst reports increase as demands for analysts' service increase and decrease as costs of information provision increases. Similar to studies based on analyst following, findings of Frankel et al. (2006) suggest that the provision of private information is an important impetus for the analyst activity.

Studies that investigate informativeness of analyst reports in the US markets conclude that by and large analyst reports are informative and that the informativeness of analyst reports stems from the fact that analyst activity is motivated by the provision of private information. However, Marhfor et al. (2010) report that the effect of analyst coverage on stock price informativeness depends on the environments of individual countries. They argue that in developed markets where the weight of institutional investors is high and disclosure regulation is strict analysts have strong motivation to provide private information and as a result analyst following has a positive influence on the stock price; in contrast, in emerging markets where the weight of institutional investors is high and disclosure regulation is strict analysts act merely as information transmitters and as a result analyst following has little influence on the stock price. While analysts have an incentive to provide information to investors, they also have an incentive to provide information as a marketing tool for the brokerage firms (Irvine, 2000; Lin and McNichols 1998; Cowen et. al 2005). Especially in emerging markets where the relative importance of trading activities by irrational individual investors is high analysts may have a stronger incentive to provide analyst reports with a view to increasing the trading activity at low information provision costs than in developed markets. If a marketing incentive is greater than the incentive to provide private information, analyst following may not be an appropriate proxy for private information production. For this reason we use the market response rather than analyst following to see whether analyst reports provide value-related information.

Studies that examine trading behaviors by investor types show that because of differences in information perceptions that arise from differences in information asymmetry,

investor rationality, investment strategy and investment horizon investors have different preferences for firm characteristics (Eakins et al., 1998; Gompers and Metrick, 1999; Chen and Lakonishok, 1999; Kang and Stulz, 1997; Brennan and Cao, 1997). These investor idiosyncrasies may give rise to different responses to analyst reports. This may be particularly relevant in the context of the Korean stock market, which is characterized by a high proportion of trading activities attributable to individual investors as well as foreign investors. The diversity of market participants may influence motivations of analysts in information provision. Different investor types which differ in information asymmetry and rationality may perceive the informativeness of analyst reports differently and show different trading responses. Therefore, we divide the market participants into individual investors, institutional investors and institutional investors and we measure the responses to analyst reports and examine the factors that influence market responses by investor types.

3. Explanations on Variables

We measure trading volume responses on the release dates of analyst reports and analyze factors that influence trading volume responses by investor types. In section 3.1 we show how we measure the informativeness of analyst reports using the absolute value of abnormal returns. In section 3.2 we provide explanations on factors that may influence the degree of informativeness of analyst reports for different investor types and we describe methods used to measure them.

3.1 Measurement of the informativeness of analyst reports using market response

Bhushan (1989b) argues that the number of analysts depends on the supply and demand of analysts service and the number of analysts is an increasing function of the informativeness of analyst reports. On the basis of this argument he examines the determinants of the informativeness of analyst reports using analyst following as a proxy for the informativeness of analyst reports. On the other hand, Frankel et al. (2006) measure the informativeness of analyst reports using the average stock price response rather than using a

proxy. The focus of this paper is to examine whether different investor types perceive the informativeness of the analyst reports differently and look into the reasons for this difference if any. Therefore, there is similarity between this study and the study by Frankel et al. (2006) in that both studies use the market response to measure the informativeness of analyst reports using the average market response on the release dates of analyst reports. However unlike Frankel et al. (2006) who measure the informativeness of analyst reports using the change in the expectation of all market participants we divide market participants into institutional investors, individual investors and foreign investors, then measure the trading responses by investor types and their determinants.

We measure the market responses to analyst reports by all market participants then by investor types. Equations (1) and (2) show market responses of all market participants using returns and trading volume, respectively. Equations (3)-(5) measure responses to analyst reports by institutional investors, individual investors and foreign investors, respectively.

1) Market responses for all investor types

$$AI = \frac{\sum_{t=1}^{NREVS} |R_{ij} - RSZE_{ij}|}{\sum_{t=1}^N |R_{ij} - RSZE_{ij}|} \times \frac{1}{NREVS_{it}} \quad \text{-----} \quad (1)$$

$$AIV = \frac{\sum_{t=1}^{NREVS} TV_{it}}{\sum_{t=1}^N TV_{it}} \times \frac{N_{it}}{NREVS_{it}} \quad \text{-----} \quad (2)$$

2) Responses for each investor type

$$AIV_{NST} = \frac{\sum_{t=1}^{NREVS} M TV_{NST}_{it}}{\sum_{t=1}^N M TV_{NST}_{it}} \times \frac{N_{it}}{NREVS_{it}} \quad \text{-----} \quad (3)$$

$$AITV_{NDI} = \frac{\sum_{t=1}^{NREVS} MTV_{NDI}_{it}}{\sum_{t=1}^N MTV_{NDI}_{it}} \times \frac{N_{it}}{NREVS_{it}} \quad \text{-----} \quad (4)$$

$$AITV_{FORE} = \frac{\sum_{t=1}^{NREVS} MTV_{FORE}_{it}}{\sum_{t=1}^N MTV_{FORE}_{it}} \times \frac{N_{it}}{NREVS_{it}} \quad \text{-----} \quad (5)$$

First, AI in equation (1) is the measure of the informativeness of analyst reports based on Frankel et al. (2006). AI is the ratio of the average absolute size-adjusted return on the forecast revision release dates on firm *i* in year *t* to annual cumulative absolute size-adjusted return. R_{ijt} is the daily return of firm *i* in portfolio *j* in year *t*. $R_{SIZE_{tj}}$ is the daily return of portfolio *j* in year *t* where five equally weighted portfolios are formed on the basis of year-end market capitalization. $NREVS_{it}$ is the number of releases of analyst reports on firm *i* in year *t*, *N* is the total number of trading days in year *t*. AI calculated as per equation (1) is more informative than the average if it is greater than 0.004. AITV in equation (2) is alternative measure of AI which is trading volume response on the analyst reports release dates. AITV is the ratio of the average trading volume on the release dates of analyst reports on firm *i* in year *t* to the annual average trading volume. TV_{it} is the daily total trading volume of firm *i* in year *t*.

The main objective of this study is to analyze the determinants of the AI by investor types. However, since the AI that Frankel et al. (2006) use is a measure based on stock price returns, it cannot measure the change in expectation of individual investors. However, since daily trading volumes are disclosed by major investor types in Korea, we measure the informativeness of analyst reports by investor types. First, $AITV_{INST}$ in equation (3) is the AI of institutional investors. $AITV_{INST}$ is the ratio of the average trading volume of institutional investors on the release dates of analyst reports on firm *i* in year *t* to the annual average trading volume of institutional investors. MTV_{INST}_{it} is the trading volume of institutional investors on firm *i* in year *t* and it is calculated as (sales volume by institutions + purchase volume by institutions)/2. $AITV_{INDI}$ in equation (4) is the AI of individual investors. $AITV_{INDI}$ is the ratio of the average trading volume of individual investors on the release

dates of analyst reports on firm i in year t to the annual average trading volume of individual investors. MTV_INDI_{it} is the trading volume of individual investors on firm i in year t and it is calculated as $(\text{sales volume by individual} + \text{purchase volume by individual})/2$. $AITV_{FORE}$ in equation (5) is the AI of foreign investors. $AITV_{FORE}$ is the ratio of the average trading volume of foreign investors on the release dates of analyst reports on firm i in year t to the annual average trading volume of foreign investors. MTV_FORE_{it} is the trading volume of foreign investors on firm i in year t and it is calculated as $(\text{sales volume by foreign investors} + \text{purchase volume by foreign investors})/2$. We measure relative informativeness using the ratio of the average trading volume response on the release dates of analyst reports to the annual average trading volume and investigate the factors that can influence the trading responses.

3.2 Determinants of the informativeness of analyst reports

Frankel et al. (2006) hypothesize that the market response to analyst reports shows a positive relationship with the market demand for information and a negative relationship with the information production costs and identity firm characteristics that can influence the market demand for information and the information production costs, then analyze the marginal effects of these factors. Following Frankel et al. (2006) we choose various firm characteristics as explanatory variables. However, since we measure the perceived informativeness of analyst reports using the trading responses by investor types, we also consider the factors that can influence the trading behaviors of investors. In addition, we investigate whether there are differences across investor types depending on the forecast measures used such as target stock price and investment recommendation scores after controlling for firm characteristics.

3.2.1 Firm characteristics

We choose firm characteristics that may influence the trading behaviors of investors on the release dates of analyst reports as follows.

Firm size (SIZE) may have an influence on the investor trading behavior. Informed traders would find larger firms which are likely to have a greater liquidity more attractive

(Bhushan, 1989b). As a result, brokerage firm analysts may have a greater incentive to provide more informative reports on larger firms and the trading volume responses on the analyst reports release dates may be greater as a result. On the other hand, a large number of analysts follow large firms making produce information more costly. The high information production costs reduce the informativeness of analyst reports reducing the trading volume response.

Analyst activity (ANALYST) may increase or decrease the AI. Previous studies claim that greater analyst activity ensues for firms about which there is more value related information (Bhushan, 1989b; O'Brian and Bhushan, 1990; McNichals and O'Brian, 1997 Piotroski and Roulstone, 2004). As a result, the informativeness of analyst reports will be greater for firms with a greater analyst activity increasing the market response by investors. In contrast, if analysts are mostly interested in low cost production of research reports then firms with more disclosed information will generate more analyst activity (Lang and Lundholm, 1996). Therefore, if analysts act as information transmitters in the market, there might be a less market response for firms with greater analyst activity since the disclosed information substitutes for analyst reports (Frankel et al., 2006; Marhfor et al., 2010).

A greater return volatility of a firm (VAR) indicates that the firm's future cash flows are more uncertain so that if analysts provide information that reduce this uncertainty will increase the market demand for the firm's stock and increase the brokerage firm's profits-making opportunities. Since analysts have an incentive to provide valuable research reports for firms with greater return volatility the market response on the analyst report release dates is expected to be greater (Bhushan, 1989b, Frankel et al., 2006). On the other hand, the costs of acquiring information about firms with greater return volatility may be greater so that it may be more difficult to generate differentiated information about the firm. This would lower the informativeness of the research reports, which would reduce the market response to the release of analyst reports.

Trading volume (LNVOL) is a result of heterogeneous beliefs and differential interpretation about the information that reaches the investors (Beaver, 1968; Kim and Verrecchia, 1991a, b; Harris and Raviv, 1993; Kandel and Pearson, 1995; Kim and

Verrecchia, 1997). Information demand increases for firms with a large trading volume so as to help investors to resolve differential interpretation about information across investors. In addition for firms with large trading volume there are many liquidity traders who add noise to the stock price. The increase in noise trade increases return volatility providing informed trader with profit-making opportunities (Verrecchia, 1982; Bhushan, 1989a). Thus, the market response to the analyst reports is expected to be larger for firms with larger trading volume. In contrast, increase in volatility due to noise trading may increase information provision costs to analysts reducing informativeness of analyst reports. This would in turn reduce the market response of investors.

The information asymmetry may be larger for firms with larger insider ownership (INSIDER). Thus, the information demand by investors may be larger for firms with high information asymmetry to help investors to alleviate the adverse selection costs (Brennan and Subramanyam, 1995). Consequently, trading volume may increase on the release dates of analyst reports. On the other hand, if analysts are sensitive to information acquisition costs analysts may not be able to provide informative reports on firms with high insider ownership.

On the other hand, analysts working on firms with high information asymmetry may present favorable information about the firm selectively, thus producing optimistic bias in an attempt to secure channels of private information (Das et al., 1998). If optimistic bias exists in the analyst reports, different investor types may perceive the informativeness of the analyst reports differently. That is, individual investors, who are non-informed traders, may overreact to reports with an optimistic bias, thus increase trading activity while institutional investors and foreign investors, who are sophisticated investors, may show little response to the reports.

Growth firms, which have a high ratio of market value to book value (MB), rely greatly on future profitability as source of firm value; thus the firm value depends greatly on the size of unrecorded intangible assets. Thus, the investor demand for analyst reports, which can guide their value judgment increases for growth firms (Barth et al., 2001). On the other hand, analysts face a high level of information production cost since they must spend a large amount of time and resources in producing research reports on growth firms.

ACCRSQ, which measures the extent to which the book value of net assets and earnings are reflected in the stock price, is a measure of the value relevance of accounting information. The demand for analysts information may decrease in firms with high value relevance of accounting information since firm information is reflected in the stock price with timeliness reducing the need for the analyst information (Lang and Lundholm, 1996). In this case public information (accounting information) replaces private information (analyst information) leading to the reduction in the market response to the release of analyst reports. On the other hand, for firms with high value relevance of accounting information the provision of private information decreases and analyst information becomes scarce leading to the large market response (Frankel et al., 2006). Thus, the net effect of the value relevance of the accounting information on the trading volume response to analyst reports is indeterminate.

Stock return synchronicity (MMRSQ) is the correlation between the firm and the market return based on the extent to which the market return explains the stock returns of individual firms (Durnev et al., 2003). Analysts working on firms with high stock return synchronicity place a greater emphasis on the macroeconomic factors than on individual firm specific factors. This reduces the information production costs and increases the analyst research activity about the firm (Bhushan, 1989b, Piotroski, 2004). This in turn makes it difficult to produce research reports with differentiated private information reducing the informativeness of the analyst reports (Frankel et al., 2006).

Intra-industry information transfer (IND_R) may increase in the number of firms in an industry (Foster, 1981). Information transfer may increase the quantity of information at the industry level as well as analyst activity leading to stock price synchronicity (Piotroski, 2004). Since in case of high information transfer private information acquisition is costly reducing the provision of private information (Frankel et al., 2006). However, the effect of information transfer on the analyst informativeness may vary with investor types. If analyst reports provide industry level information sophisticated investors such as institutional investors show limited response, unsophisticated investors may show significant response.

Market response to good news (GNEWS) and bad news may be asymmetrical. Managers have a strong incentive to get good news reflected in the price quickly and bad

news reflected in the price slowly (Hong et al., 2000). Therefore, if analysts play the role of information transmitter, their forecasts may have an optimistic bias. If so, informed investors (institutional investors), who discern the optimistic bias of the analysts, may not show volume response on the announcement day while uninformed investors (individual investors) show a greater volume response the more optimistic the analyst forecasts are.

Advertisement expense (ADVER) may influence the recognition of the investors. According to investor recognition hypothesis (Merton, 1987), investors may hold concentrated portfolio due to cognitive limitation, trading stocks of firms which present themselves to the attention of investors via news media. Similarly, Grullon et al. (2004) report that the ownership proportion of individual investors is greater for firms that spend more money on advertising since they generate more interest of investors in the capital market. However, the ensuing increase in the analyst activity may intensify the competition among the analysts reducing the informativeness of analyst reports.

Total asset turnover (TOA) is an indicator of the short-term performance of a firm. According to Hessel and Norman (1992), since institutions are evaluated and compensated quarterly, they have an incentive to hold firms that show a good short-term performance. Therefore, institutions may increase demand for the analyst reports for firms with a good short-term performance the institutions may show a greater announcement date volume response to the analyst report on a firm with a good short-term performance than do other types of investors.

Investors may show a negative volume response to firms with high debt ratio (DEBT). According to Eakins et al. (1998), by and large institutional investors follow the prudent-man rule) preferring stocks of firms with low debt ratio. In addition, Kang and Stulz (1997) report that there is an information asymmetry between domestic investors and foreign investors and foreigner investors who face information disadvantage prefer firms with low debt ratio. The different disposition toward the financial gearing may cause different types of investors to show a different volume response to the informativeness of analyst reports.

3.2.2 Forecast characteristics

In addition, we measure the announcement day volume response to the target price discrepancy ratio, target price coefficient of variation, investment recommendation score, and change in investment recommendation for each investor type, and then discuss the difference across investor types if any. Next, we explain the analyst forecast characteristics.

Target price discrepancy ratio (TPDR) is the ratio of the difference between the target price and the actual price to the actual price. Analysts working for brokerage firms have an incentive not only to provide information but also to pursue the interests of firms which hired them. The conflict of interest may cause optimistic bias in their forecasts and to the extent the optimistic bias is permanent, the market would show a limited response to the analyst reports. Therefore, we investigate whether investors recognize analyst forecasts as information or optimistic bias as the TPDR rises. We perform this test by investor type using the announcement day volume response.

Target price coefficient of variation (TPCV) is the ratio of the variance of the target price to the average target price. High TPCV indicates that analysts face a greater target price uncertainty. Therefore, we investigate whether investors recognize the informativeness of analyst reports differently depending on the TPCV for each investor type.

Investor recommendation score (IRS) measures the strength of buy and sell recommendation analysts make for the stock of an individual firm. If investors trust analysts' investment recommendation the market would show a greater volume response to a firm with a high IRS firm. If however investors do not trust analysts' investment recommendation, the volume response would be muted. Therefore, we measure and compare the volume response of investors to IRS for each investor type.

Change in investment recommendation score (Δ IRS) is the change in IRS for an individual firm. Sophisticated investors would increase trading volume when there is a meaningful event such as a change in investment recommendation. However, unsophisticated investors may fail to notice the change in investment recommendation. Therefore, we measure and compare the volume response to Δ IRS for each investor type. That is, we examine whether in a given year there is a difference in the volume response between firms with a large change in investment recommendation and those without.

4. Research Models

The objective of this study is to measure the average informativeness of analyst reports and analyze the determinants of the informativeness of analyst reports. For this we propose three regression models. Model 1 analyzes the effect of the transaction volume response of the analyst report publication date by investor types on the market as a whole. Then, we carry out the OLS regression analysis of models such as Model 1 to investigate which investor type is the most responsive to analyst reports.

The dependent variable of Model 1 is the market response to analyst reports, which we measure using abnormal returns (AI) and trading volume (AITV). Independent variables are institutional investor trading volume response (AITV_{INST}), individual investor trading volume response (AITV_{INDI}), foreign investor trading volume response (AITV_{FORE}) while firm size (SIZE) and the number of analyst reports (ANALYST) are used as control variables. SIZE is the log of the total market capitalization of the stock of firm *i* at the end of year *t*, ANALYST is the log of the number of analyst reports on firm *i* in year *t*. Σ YEAR is the year dummy, Σ ID is the industry dummy where firms are classified into 15 industries based on the standard industry codes.

[Model 1]

$$\begin{aligned} & \text{Dependent Variable} \quad (AI, AITV) \\ & = \beta_0 + \beta_1 AITV_{INST} + \beta_2 AITV_{INDI} + \beta_3 AITV_{FORE} + \beta_4 SIZE + \beta_5 ANALYST + \Sigma YERA \\ & \quad + \Sigma ID + \varepsilon \end{aligned}$$

[Model 2]

$$\begin{aligned} & \text{Dependent Variable} \quad (AITV, AITV_{INST}, AITV_{INDI}, AITV_{FORE}) \\ & = \beta_0 + \beta_1 FIT_VAR + \beta_2 FIT_VOL + \beta_3 SIZE + \beta_4 ANALYST + \beta_5 NSDER + \beta_6 MB \\ & \quad + \beta_7 ACCRSQ + \beta_7 M M RSQ + \beta_7 ND_R + \beta_7 GNEW S + \beta_7 ADVER + \beta_7 TOA + \beta_7 DEBT \\ & \quad + \varepsilon_1 \end{aligned} \tag{2-1}$$

$$VAR = \beta_0 + \beta_1 NST + \beta_2 OW NERS + \beta_3 SZE + \beta_4 MB + \beta_5 ACCRSQ + \beta_6 M M RSQ + \beta_7 IND_R + \beta_8 SEGMENT + \beta_9 R_VOL + \varepsilon_2 \quad (2 - 2)$$

$$LNVOL = \beta_0 + \beta_1 NST + \beta_2 OW NERS + \beta_3 SZE + \beta_4 MB + \beta_5 ACCRSQ + \beta_6 M M RSQ + \beta_7 N D_R + \beta_8 SEGMENT + \beta_9 R_VAR + \varepsilon_3 \quad (2 - 3)$$

[Model 3]

Dependent Variable ($AITV$, $AITV_{NST}$, $AITV_{NDI}$, $AITV_{FORE}$)

$$= \beta_0 + \beta_1 TPDR + \beta_2 TPCV + \beta_3 RS + \beta_4 \Delta RS + \gamma_K \Sigma Control Variable + \varepsilon$$

Variable Definition

AI	=	a measure of informativeness of analyst reports based on abnormal returns; the absolute value of the size-adjusted announcement day abnormal return of firm i in year t divided by annual sum of size-adjusted announcement day abnormal returns
AITV	=	a measure of informativeness of analyst reports based on trading volume; the announcement day trading volume of firm i in year t divided by annual trading volume
AITV _{INST}	=	a measure of informativeness of institutional investor for firm i in year t. the announcement day trading volume of firm i in year t divided by annual institutional trading volume
AITV _{INDI}	=	a measure of informativeness of individual investor for firm i in year t. the announcement day trading volume of firm i in year t divided by annual individual trading volume
AITV _{FORE}	=	a measure of informativeness of foreign investor for firm i in year t. the announcement day trading volume of firm i in year t divided by annual foreign trading volume
SIZE	=	log of the total market capitalization of the stock of firm i at the end of year t
ANALYST	=	log of the number of analyst reports on firm i in year t
FIT_VAR	=	predicted value estimated by Model 2-2 in year t
FIT_VOL	=	predicted value estimated by Model 2-3 in year t
R_VAR	=	relative variance based on the ranking of the return variances of individual stocks in year t

R_VOL	=	relative volume based on the ranking of the volume of individual stocks in year t.
INSIDER	=	shares owned by insiders (largest shareholders and related parties, shareholders with more than 10% of the stock and executives) divided by all voting shares
MB	=	market-to-book ratio of the equity
ACCRSQ	=	measure of the price-earnings association based on the fitted residuals of a pooled cross-sectional regression of prices on the book values of shareholders' equity and earnings as described in Frankel et al. (2006)
MMRSQ	=	R^2 of the market model
IND_R	=	number of listed firms in industry i divided by the number of all listed firms
GNEWS	=	dummy variable taking the value of one if the firm IRS is greater than the median IRS and zero otherwise
ADVER	=	advertising expense divided by revenues
TOA	=	revenues divided by total assets
DEBT	=	book value of debt divided by total assets
INST	=	ratio of shares owned by institutional investors to the number of shares outstanding
OWNER	=	number of shareholders of firm i in year t as found on the annual report
SEGMENT	=	number of business segments of firm i in year t
VAR	=	variance of the daily trading volume in year t for firm i
LNVOL	=	log of the sum of the daily trading volume in year t for firm i
YEAR	=	year dummy (2005-2009).
ID	=	industry dummy
TPDR	=	consensus target price discrepancy ratio in year t for firm i; the absolute value of the ratio of the difference between the target price and the actual price to the actual price; consensus data is from FnGuide
TPCV	=	coefficient of variation of analysts' target price of firm i in year t; ratio of coefficient of variation of quarterly consensus target price of firm i in year to the average target price; consensus data is from FnGuide
IRS	=	investment recommendation score taking the value between 1 and 5; quarterly average is used; consensus data is from FnGuide
Δ IRS	=	percentage change in investment recommendation score

Using Model 2 we examine the factors that influence the volume response to the analyst reports for each investor type. In Model 2.1 the dependent variable (DV) is (i) total volume response to analyst reports (AITV), (ii) volume response of institutional investors (AITV_{INST}), (iii) volume response of individual investors (AITV_{INDI}), (iv) volume response of foreign investors (AITV_{FORE}). We use as explanatory variables those variables, which Bhushan (1989b) and Frankel et al. (2006) use that influence information supply and demand and those that influence investors' trading behaviors. Since prior studies (O'Brien and Bhushan, 1990; Alford and Berger, 1999; Frankel et al., 2006) report that factors that influence the informativeness of analyst reports may suffer from endogeneity, we use simultaneous equation models. We use the two-stage least-squares regression in order to reduce endogeneity following Frankel et al. (2006).

SIZE is the log of the market capitalization at the end of year t. ANALYST is the number of analyst reports in year t. INSIDER is the shareownership of insiders at the end of year t. MB is the market-to-book ratio of equity in year t. ACCRSQ is a measure of correlation between the stock price and accounting information in year t. MMRSQ is the coefficient of determination of the market model in year t. IND_R is the number of listed firms in industry i divided by the number of all listed firms. GNEWS is a dummy variable taking the value of one if the firm IRS is greater than the median IRS and zero otherwise. ADVER is the ratio of advertising expense to revenues in year t, TOA is the ratio of revenues to total assets. DEBT is the ratio of debt to total assets. FIT_VAR and FIT_VOL are predicted values of VAR and LNVOL estimated by Model 2-2 and Model 2-3, respectively.

Model 2-2 and Model 2-3 are the first stage of the 2SLS regression model designed to reduce the endogeneity. VAR is the variance of returns in year t. LNVOL is log of total volume in year t. R_VAR and R_VOL are used to reduce heteroskedasticity. R_VAR takes values of 0, 1, 2 and 3 depending on the rankings of the variance of the portfolios to which individual firms are assigned based on the variance rankings. Similarly, R_VOL takes values of 0, 1, 2 and 3 depending on the rankings of the trading volumes of the portfolios to which individual firms are assigned based on the trading volume rankings. INST is the fraction of

shares held by institutions in year t, OWNERS is the number of shareholders of firm in year t. SEGMENT is the number of business segments of firm i in year t.¹

We examine the effect of forecast characteristics on the trading volume responses for each investor type using Model 3. Dependent variables of Model 3 are (1) AITV, (2) AITV_{INST}, (3) AITV_{INDI}, (4) AITV_{FORE} and the independent variables are target price discrepancy ratio (TPDR), coefficient of variation of target price (TPCV), investment recommendation score (IRS), change in investment recommendation score (Δ IRS). TPDR the absolute value of the ratio of the difference between the target price and the actual price to the actual price; consensus data is from FnGuide. TPCV is the coefficient of variation of analysts' target prices of firm i in year t. The ratio of coefficient of variation of quarterly consensus target price of firm i in year to the average target price is used. The consensus data is from FnGuide. Investment recommendation score takes the value between 1 and 5. A quarterly average is used. The consensus data is from FnGuide. Δ IRS is the percentage change in investment recommendation score, which is from FnGuide Data Guide Pro. We sum the absolute values of the quarterly changes in investment recommendation score in a year. Control Variables are the vector of variables that are shown to be statistically significant factors of total trading volume responses (Model 2).

We estimate separate year samples one at a time to reduce the heteroskedasticity using Models 2 and 3, and then average the estimated coefficients of proposed factors (Barth, 2001; Frankel 2006). We test the statistical significance of the average estimated coefficients using the Newey-West (1987). Newey-West (1987) test statistic is calculated as follows.

$$Z = \frac{(\text{MEAN } t \text{ statistics})}{\text{STD DEV } t \text{ statistics} / \sqrt{(T - 1)}}$$

where, T= Number of years, MEAN t statistics= Average t statistic of yearly coefficients, STD DEV t statistics= Sample standard deviation of the t statistics of the yearly coefficients.

¹ The number of business segments (SEGMENT) is obtained by counting the business segments disclosed in a footnote of the firm's annual reports.

5. Empirical Results

5.1 Sample selection

We sample firms with December fiscal year-end for which there is one or more analyst reports for the 2005-2009 period. Of these we exclude financial firms as well as firms with negative book equity. We also exclude the first year after the IPO for the firms which underwent the IPO during the study period. In addition, we exclude firms for which we do not find either the accounting or the market data from FnGuide Data Guide Pro. As a result, we arrive at the sample of 1,225 firm-years. Especially, we hand-collect the announcement dates as well as the number of analyst reports for the study period from the Research Reports of FnGuide. We obtain the accounting information, stock price and trading volume of sample firms from FnGuide Data Guide Pro as well as Financial Supervisory Services DART(electronic disclosure system), which we use to measure the informativeness of the analyst reports.

Table 1 shows the number of reports brokerage firms have published on the sample firms as well as the number of days analyst reports have been published by year. $NANALYST$ is the number of analyst reports brokerage firms have published on firm i in year t , $NREVS$ is the number of days analysts employed by brokerage firms publish on firm i in year t . Table 1 shows that the number of firms analysts cover increases from 231 to 287 and the number of reports per firm increases from 36.31 to 53.42 during the sample period. On the other hand, the median number of reports per firm shows little change. While the average $NREVS$ rises, the median changes little.

[Insert Table 1 about here]

5.2 Descriptive statistics and correlation

Table 2 shows the descriptive statistics of variables used in the key analyses based on the sample which was winsorized at $\pm 1\%$ to control the influence of extreme observations. Panel A of Table 2 shows the descriptive statistics of the announcement day market response. The average AIR is 0.0052, which is greater than 0.004, which corresponds to the case of no

information. $AITV$, $AITV_{INST}$, $AITV_{INDI}$, $AITV_{FORE}$ are all greater than 1 indicating that investors recognize analyst reports as information and reflect them in their investment decision-making. Panel B is the descriptive statistics of the firm characteristics which can influence informativeness of analyst reports. In particular, the average ACCRSQ, stock price-earnings correlation measure, is 3.5909, which is much larger than 0. This suggests that analysts research firms with a high stock price-earnings correlation. Panel C shows the descriptive statistics of analyst consensus forecasts. The average TPDR is 41% indicating that there is a considerable discrepancy between the actual price and the target price. The average IRS is 3.775 indicating that there are more buy recommendations than sell recommendations on average. This is consistent with the belief that analyst forecasts tend to overshoot than undershoot. The average TPCV is 13.5% of the average analyst target price. ΔIRS is 1.22, which is the cumulative sum of the quarterly IRS variances.²

[Insert Table 2 about here]

Table 3 shows the correlation between key variables. The upper triangle is the Spearman correlation coefficients; the lower triangle is the Pearson correlation coefficients. SIZE, ANALYST, LNVOL, ACCRSQ, MMRSQ, ADVER, DEBT show a negative relationship with the market response to the analyst reports. INSIDER, GNEWS, TOA show a positive relationship with the market response to the analyst reports. Furthermore, FPDR and IRS show a positive relationship with the informativeness. The correlation coefficient between SIZE and ANALYST is 0.795 indicating that more reports get written on larger firms.

[Insert Table 3 about here]

5.3 Tests of informativeness of analyst reports on the announcement dates

We use the market response to measure the informativeness of analyst reports as in Frankel et al. (2006) and Beaver (1968).

[Insert Table 4 about here]

² Out of the total sample of 1,225 the number of firms for which there is a change of investment recommendation score is 410, that is, about 33% of the total sample.

Table 4 shows the sample means as well as the corresponding t statistics of various measures of informativeness of analyst reports. Panel A shows the measures of trading responses to analyst reports by all investors by year. AI is greater than 0.004 every year and the difference is statistically significant showing that investors perceive analyst reports as information. AITV is greater than 1 every year and the difference is statistically significant showing that analyst reports change the expectations of investors leading to changes in trading volume.

Panel B shows the trading volume response to analyst reports for each investor type. All investor types show trading response measures greater than 1 and the difference are statistically significant. However, volume responses by individual investors measured by $AITV_{INDI}$ are large while those by foreign investors are relatively small. Therefore, there is a difference in the trading volume responses to analyst reports across investor types

5.4 Market responses before and after the analyst reports announcements

If analyst reports are not fairly disseminated (i.e., leaked before the public announcement), there would be a significant level of market response and on the announcement dates market responses may be correspondingly smaller. If the disclosure effects on the announcement dates are small, analyzing the determinants of the market response using the announcement date market responses may not be appropriate. Therefore, we compare the market responses before and after the announcements of analyst reports in order to see whether there is disclosure effect on the announcement date.

Table 5 shows the average market responses to analyst reports (AI, AITV, $AITV_{INST}$, $AITV_{INDI}$, $AITV_{FORE}$) as well as the corresponding t statistics (1) on the announcement dates, (2) one day before the announcement dates, (3) one day before the announcement dates Column (4) shows the difference in market response between D_{-1} and D_{-2} ; column (5) shows the difference in market response between D_0 and D_{-1} . As for the market response of all investors (AI, AITV), the market response rises from D_{-2} and reaches the peak on D_0 . The market responses of each investor type ($AITV_{INST}$, $AITV_{INDI}$, $AITV_{FORE}$) show a similar pattern rising from D_{-2} and reaching the peak on D_0 . Since the announcement date effects are

greatest, we use the announcement date market responses to study the informativeness of the analyst reports. We note as an aside that when we compare the market responses by investor types we find that the institutional investors show the greatest market responses before the announcement dates suggesting that institutional investor are informed traders.

[Insert Table 5 about here]

5.5 Effect of the trading response to analyst reports of each investor type on the overall market response

In order to investigate the relationship between the AI and the investor types, we analyze the relationship between the trading response of each investor type and the overall market response. Table 6 shows the regression estimates of Model 1.

[Insert Table 6 about here]

Panel A shows that the announcement date abnormal return (AI) is sensitive to the trading activities of individual investors whereas the effect of the trading activities of foreign traders is not statistically significant. Panel B also shows that the trading volumes of individual investors have the greatest effect on those of the market while those of foreign traders have least effect on the market. This result suggests that only individual investors find the analyst reports informative. This may be due to the fact that in a market characterized by a high proportion of the direct investment by individual investors like the Korean market analysts have an incentive to provide research reports for individual investors.

5.6 Determinants of trading responses to analyst reports for each investor type

Results up to this point show that individual investors are the most responsive investor type while foreign investors show the least responsiveness. On the other hand, before the announcement date institutional investors show greater responses than do individual investors and foreign investors. Given that responses to analyst reports are different across investor types, there may be differences in the determinants of the trading responses to analyst reports. Therefore, we examine the determinants of the trading response to analyst

reports for each investor type and investigate the motivations for analysts to provide information provision and compare the differences between investor groups.

Table 7 shows the results of 2SLS regression analysis of Model 2, which expresses the relationship between the trading responses and their determinants for each investor type. The dependent variables are (1) AITV, (2) AITV_{INST}, (3) AITV_{INDI}, (4) AITV_{FORE}, respectively. We subdivide the sample by year to reduce heteroskedasticity. We indicate the time-series means of coefficients. We also adjust the statistical significance of regression coefficients using the adjusted statistics of Newey-West (1987) as in Barth (2001) and Frankel et al. (2006).

[Insert Table 7 about here]

We find that trading responses of all investors on the announcement dates (AITV) have a negative relationship with the number of analysts (ANALYST), correlation with the market (MMRSQ). This may be due to the fact that analysts face a high cost of providing information for firms with a large analyst following, fail to deliver informative reports, the market concludes that the analyst reports are low in the informativeness. Advertising expenses as well as debt ratio have a negative relationship with the trading responses. This suggests that investors are already aware of firms which incur a large advertising expense and have a low regard for information in the analyst reports on high debt firms. Share ownership of insiders (INSIDER) and good news (GNEWS) show a positive influence on the trading responses. This result is consistent with the interpretation that investors show a great responsiveness to information on firms that investors perceive to be opaque as well as to optimistic reports.

We see differences in the factors that influence the trading responses across investor types. Trading responses of institutional investors (AITV_{INST}) are lower for a larger firm and a firm with a larger analyst following suggesting that institutional investors have a lower regard for the information in the analyst reports on a large firm as well as a firm with a large analyst following. On the other hand, institutional investors show trading responses which increase in return volatility (FIT_VOL) suggesting that institutional investors are informed traders. In comparison, trading responses of individual traders on the announcement dates of

analyst reports ($AITV_{INDI}$) show a negative relationship with the analyst following (ANALYST), correlation with the market (MMRASQ), advertising expenses (ADVER), and debt ratio (DEBT) while showing a positive relationship with insiders' share ownership (INSIDER) and good news (GNEWS).

Determinants of trading responses of individual investors are almost identical to those of the overall investors. This result suggests that the perceived informativeness of analyst reports is mainly attributable to individual investors, which is consistent with the results in Table 6. Trading responses of individual investors increase with the number of firms in the industry (IND_R). This result may be due to the fact that individual investors fail to recognize the transmission of information within the industry so that they respond to information on firms with large intra-industry information transmission. Finally, positive news have a positive influence on the trading responses of foreign investors while advertising expenses have a negative influence while the effects of the other factors are not statistically significant.

In summary, the relationships between the trading responses and their determinants across the invest types are as follows. First, market responses to analyst reports are driven primarily by individual investors. Second, individual investors show a large response to small to medium sized firms as well as to optimistic forecasts and fail to take advantage of intra-industry information spill-over effects. Third, institutional investors respond to neglected firms, which present a large information asymmetry and firms with large return volatility suggesting that they are informed traders. Fourth, trading responses decrease with rising costs of information provision and measures of analyst activity have a negative relationship with informativeness measures. The results as a whole suggest that analysts' role as information transmitter is more important than that of information provider.

5.7 Effect of forecast characteristics on trading volume responses to analyst reports for each investor type

We analyze the effect of analyst forecast characteristics on the trading volume responses to analyst reports for each investor type. Table 8 shows the regression results of

Model 3 which represents the relationship between the trading responses of each investor type and the characteristics of the consensus forecasts. We use as analyst forecast characteristics target price discrepancy ratio (TPDR), the coefficient of variation of the target price (TPCV), investment recommendation score (IRS), change in investment recommendation score (Δ IRS) to study the effect of characteristics of the consensus forecasts on the trading responses of each investor type. We use as control variables those factors which are the statistically significant explanatory variables for the trading volumes of all investors, which are shown in Table 7. In order to reduce heteroskedasticity we use separate year regressions. We show the time-series means of the coefficients of each factor.

[Insert Table 8 about here]

Trading responses of all investors increase with target price discrepancy ratio and investment recommendation score and are greater with the optimistic news. However, when we subdivide the whole sample into subsamples by investor type we find differences in the determinants. The trading responses of institutional investors increase with target price discrepancy ratio and the change in investment recommendation score. The trading responses of individual investors increase with the target price discrepancy ratio and decrease with the coefficients of variations of target price changes in the investment recommendation score. The investment recommendation score has a positive effect on the trading responses of individual investors. However, the change in investment recommendation score does not have a statistically significant effect on the trading responses of individual investors. On the other hand, none of the factors considered has a statistically significant effect on the trading responses of foreign investors.

We find different investors show different trading responses to analyst forecast characteristics. Individual investors are the most responsive group to optimistic forecasts and show the most trading volume response for a given level of revision in target stock prices from current stock prices. Institutional investors show a positive volume response to the change in investment recommendation score. Institutional investors find the change in the investment recommendation score informative while individual investors respond primarily to the level of investment recommendation.

6. Summary and Conclusions

Due to differences in information asymmetry and investor rationality by investor type, different investor types may perceive differently the informativeness of analyst reports from the same brokerage firm. Therefore, we categorize the investor population in the Korean stock market into institutional investors, individual investors, and foreign investors and study trading volume responses of each investor type to analyst reports.

Analysts are generally believed to enhance the efficiency of the markets by reducing the information asymmetry that exists between the firms and the investors. However, despite the positive role that analysts play the markets are increasingly suspicious of the information they provide. Target prices that analysts post tend to be too optimistic and their sell recommendations are a rarity. These considerations motivate us to examine whether analyst reports are informative in the Korean stock market using the trading volume responses across investor types and their determinants.

Rather than using proxies of informativeness such as the analyst following and the forecast accuracy, we use the announcement date market responses to measure the informativeness as in Frankel et al. (2006). Taking advantage of the trading volume data for the three main investor types in the Korean stock market, we study the trading volume responses for each investor type and make comparisons across investor types. We use 1,225 firms, for which there has been at least one analyst reports for the 2005-2009 period. The main findings are as follows.

First, the announcement date abnormal returns as well as the trading volume responses are positive and statistically significant suggesting that investors tend to find the information in the analyst reports informative. Second, the regression results of the models that study the responses of the overall market as well as the trading responses of each investor type show that trading behaviors of the individual investors influence the overall market response the most. Foreigners do not appear to find the analyst reports informative. Third, of the firm characteristics the return volatility has a positive influence on the trading responses

of institutional investors while the firm size and the analyst following have a negative influence. Trading volume responses of individual investors show a negative relationship with the analyst following, correlation with the market, advertising expenses, and debt ratio while having a positive relationship with the insiders' share ownership, the number of firms in the industry, and the good news dummy. On the other hand, the trading responses of foreign investors show no relationship with any firm characteristic. Finally, from the models of the effects of forecast characteristics of the trading volume responses of each investor type target price discrepancy ratio and the change in the investment recommendation score have a positive influence on the trading volume responses of the institutional investors. The trading volume responses of individual investors show a positive relationship with target price discrepancy ratio and investment recommendation score and a negative relationship with the coefficient of variation of target prices. In contrast, foreign investors do not show statistically significant trading volume responses which are influenced by any of the forecast characteristics considered.

Our findings suggest the following. In emerging markets such as those of Korea individual investors are the most responsive to analyst reports of all investor types, showing a large response to small to medium firms and to optimistic reports. They tend to overreact to the analyst forecasts suggesting that they are unsophisticated. Institutional investors respond to information on neglected firms characterized by large information asymmetry and they increase trading volumes prior to the analyst report announcement dates suggesting that they are informed traders. Foreign investors show little response to analyst reports suggesting that they do not find the information informative or trustworthy. The informativeness of the Korean analyst reports decreases with the costs of providing information suggesting that Korean analyst reports simply repackage and transmit disclosed information.

In summary, we document evidences that justify the concern that institutional investors are informed traders taking advantage of individual investors in underdeveloped markets as well as in emerging markets. Our results give empirical support for a wide range of institutional practices in the capital markets explaining the importance of the fair disclosure by issuers, the strict code of conduct of all market participants including

institutional investors, the need for the investor education and the separation between institutional investors and individual investors in the legal treatments in the context of security exchange laws as well as the importance of the market policing efforts of capital market regulators.

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Table 1. Analyst activity

NANALYST is the number of reports that brokerage analysts have published in year t for firm i. NREVS is the number of days when brokerage analysts have published reports. We collect the data from FnGuide Research Report by firm and by year. We count as one the firm that publishes more than one report on a given firm on a given day.

Variables	YEAR	N	Mean	Std.dev	Min	Q1	Median	Q3	Max
NANALYST	2005	231	36.31	45.05	1.00	4.00	16.00	49.00	190.00
	2006	229	36.28	45.60	1.00	5.00	14.00	51.50	207.00
	2007	242	40.27	52.05	1.00	5.00	17.00	59.25	313.00
	2008	236	50.69	63.74	1.00	5.25	21.00	75.25	337.00
	2009	287	53.42	71.47	1.00	5.00	16.00	78.00	345.00
	Total	1225	43.87	57.71	1.00	5.00	17.00	61.00	345.00
NREVS	2005	231	23.33	23.26	1.00	4.00	15.00	36.00	94.00
	2006	229	22.72	22.72	1.00	5.00	12.00	35.00	96.00
	2007	242	25.16	26.29	1.00	5.00	15.00	37.00	144.00
	2008	236	29.67	30.56	1.00	5.00	17.00	44.75	156.00
	2009	287	30.32	33.42	1.00	5.00	14.00	48.00	158.00
	Total	1225	26.44	28.01	1.00	5.00	15.00	41.00	158.00

Table 2. Descriptive statistics

This table shows the descriptive statistics of the sample. Sample is the listed firms for which there has been at least one analyst report published for the 2005-2009 period. Stock return, accounting information and ownership information are from FnGuide Data Guide Pro. The analyst report announcement dates and the number of analyst reports are culled manually from FnGuide Research Reports and, analyst forecasts are from FnGuide consensus information. Sample is $\pm 1\%$ winsorized.

Variable	N	Mean	Std. Dev	Min	Max
Panel A: Measures of the informativeness of analyst reports					
AI	1225	0.0052	0.0023	0.0010	0.0153
AITV	1207	1.4757	0.9028	0.3078	6.2235
AITV _{INST}	1205	1.4494	1.1629	0.0208	7.9823
AITV _{INDI}	1225	1.5161	0.9654	0.2702	6.5698
AITV _{FORE}	1198	1.2814	0.9936	0.0742	7.2739
Panel B: Firm characteristics					
SIZE	1225	5.6530	0.7138	4.1368	8.1129
ANALYST	1225	1.2533	0.6211	0.3010	2.5378
VAR	1222	0.4901	0.1452	0.2461	0.9368
LNVOL	1221	3.5007	1.6744	-0.5020	6.9402
INSIDER	1220	0.4407	0.1580	0.0511	0.8694
MB	1214	1.3828	1.4132	0.1939	9.5276
ACCRSQ	1049	3.5909	3.4448	-9.0054	9.8435
MMRSQ	1203	0.2178	0.1427	0.0043	0.6139
IND_R	1225	0.0828	0.0571	0.0073	0.2237
GNEWS	1142	0.4781	0.4997	0.0000	1.0000
ADVER	1223	0.0107	0.0207	0.0000	0.1341
TOA	1217	0.2115	0.4565	0.0006	2.0500
DEBT	1223	0.4446	0.1867	0.0579	0.9411
Panel C: Analyst forecast characteristics					
TPDR	1136	0.4130	0.3529	0.0507	2.3199
TPCV	947	0.1350	0.0664	0.0053	0.4735
IRS	1142	3.7749	0.2885	2.8475	5.0000
Δ IRS	1225	1.2203	2.8608	0.0000	18.9200

Table 3. Simple correlation between variables

This table shows the correlation between key variables. The upper triangle is the Spearman correlation coefficients; the lower triangle is the Pearson correlation coefficients. Sample is the listed firms for which there has been at least one analyst report published for the 2005-2009 period. Stock return, accounting information and ownership information are from FnGuide Data Guide Pro. The analyst report announcement dates and the number of analyst reports are culled manually from FnGuide Research Reports and, analyst forecasts are from FnGuide consensus information. Sample is $\pm 1\%$ winsorized. *, ** are 5%, 1% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) AI		.497**	.285**	.500**	.171**	-.208**	-.246**	.044	-.084**	.065*	-.142**	-.137**	.008	.061*	-.066*	.073*	-.074**	.102**	-.001	.065*	-.117**
(2) AITV	.557**		.613**	.933**	.478**	-.275**	-.265**	.008	-.122**	.087**	-.160**	-.146**	.088**	.137**	-.136**	.144**	-.107**	.137**	-.019	.179**	-.110**
(3) AITV _{INST}	.361**	.662**		.495**	.301**	-.132**	-.100**	.083**	-.001	.044	-.050	-.026	.055	.066*	-.067*	.106**	-.056	.132**	-.007	.106**	-.037
(4) AITV _{INDI}	.542**	.969**	.564**		.383**	-.282**	-.285**	-.030	-.172**	.101**	-.149**	-.188**	.083**	.136**	-.129**	.146**	-.140**	.126**	-.037	.173**	-.123**
(5) AITV _{FORE}	.246**	.530**	.339**	.461**		.044	.048	.017	.037	.019	-.039	-.010	.021	.024	-.048	.062*	-.019	.007	.003	.062*	-.007
(6) SIZE	-.251**	-.307**	-.231**	-.303**	-.120**		.786**	-.126**	.428**	-.170**	.129**	.396**	-.002	-.256**	.186**	-.083**	.112**	-.369**	.002	-.258**	.399**
(7) ANALYST	-.314**	-.335**	-.244**	-.341**	-.159**	.795**		-.074*	.432**	-.300**	.172**	.387**	.091**	-.190**	.216**	-.069*	.098**	-.243**	.007	-.172**	.443**
(8) VAR	.032	-.009	.045	-.040	.004	-.144**	-.072*		.364**	.027	.189**	.142**	.067*	.125**	-.142**	-.108**	.293**	.442**	.337**	.126**	-.149**
(9) LNVOL	-.083**	-.136**	-.060*	-.174**	-.015	.425**	.436**	.368**		-.308**	-.032	.396**	.244**	-.129**	-.052	-.010	.292**	-.034	.160**	-.114**	.200**
(10) INSIDER	.103**	.110**	.083**	.120**	.051	-.201**	-.309**	.037	-.318**		.051	-.150**	-.103**	-.040	-.128**	.004	-.092**	.066*	.005	-.070*	-.131**
(11) ACCRSQ	-.156**	-.162**	-.115**	-.143**	-.096**	.182**	.229**	.223**	-.061	.061*		.263**	-.010	.073*	.001	-.082**	-.045	.143**	.081*	.069*	.056
(12) MMRSQ	-.153**	-.172**	-.095**	-.193**	-.092**	.381**	.369**	.110**	.383**	-.151**	.225**		.182**	-.060*	-.095**	-.202**	.097**	-.039	.114**	-.074*	.129**
(13) IND_R	.040	.047	.039	.039	.028	.015	.084**	.044	.249**	-.132**	-.020	.152**		.023	-.218**	.074*	-.092**	.034	.060	.017	.069*
(14) GNEWS	.093**	.168**	.115**	.165**	.075*	-.227**	-.187**	.114**	-.124**	-.040	.067*	-.049	-.013		-.124**	-.004	-.034	.298**	-.267**	.879**	-.469**
(15) ADVER	-.043	-.069*	-.056	-.062*	-.054	.083**	.086**	-.115**	-.170**	-.008	.015	-.154**	-.167**	-.095**		-.100**	-.051	-.117**	-.068*	-.104**	.111**
(16) TOA	.074**	.147**	.096**	.139**	.136**	-.066*	-.057*	-.162**	.003	-.057*	-.176**	-.179**	.023	-.076*	-.011		.132**	-.231**	-.054	.002	.066*
(17) DEBT	-.069*	-.092**	-.057*	-.118**	-.037	.093**	.097**	.295**	.296**	-.091**	-.050	.113**	-.097**	-.033	-.137**	.035		.044	.167**	-.047	.032
(18) TPDR	.097**	.138**	.129**	.132**	.020	-.316**	-.220**	.448**	-.011	.057	.087**	-.089**	-.025	.226**	-.053	-.184**	.068*		.091**	.337**	-.282**
(19) TPCV	-.040	-.035	-.011	-.057	.025	-.050	-.070*	.345**	.124**	.015	.060	.069*	.048	-.237**	-.043	.041	.141**	.172**		-.290**	.167**
(20) IRS	.059*	.145**	.106**	.137**	.082**	-.077**	.030	.094**	-.022	-.144**	.082**	-.015	-.003	.732**	-.053	-.079**	-.052	.243**	-.222**		-.455**
(21) Δ IRS	-.003	-.035	-.018	-.036	-.050	.108**	.115**	-.048	.054	.000	.014	.003	.056*	-.343**	.051	.112**	.023	-.092**	.106**	-.276**	

Table 4. Market responses on the analyst reports announcement dates

This table shows the sample means as well as the corresponding t statistics of various measures of trading responses to analyst reports. Panel A shows abnormal returns (AI) and trading volume responses (AITV), measures of trading response to analyst reports by all investors by year. Panel B shows AITV_{INST}, AITV_{INDI}, AITV_{FORE}, trading volume responses to analyst reports for each investor type. *, ** are 5%, 1% significance levels, respectively.

Panel A: Market response							
(1) AI ^{a)}				(2) AITV ^{b)}			
period	sample	mean	t-value	period	sample	mean	t-value
total	1225	0.0052**	18.20	total	1205	1.4494**	14.37
2005	238	0.0056**	8.65	2005	229	1.5739**	6.87
2006	237	0.0054**	8.79	2006	223	1.6069**	6.19
2007	249	0.0054**	9.94	2007	240	1.3420**	5.61
2008	244	0.0047**	5.65	2008	235	1.2863**	4.46
2009	299	0.0051**	7.85	2009	278	1.4513**	6.89

Panel B: Trading volume response by investor type

(4) AITV_INST ^{b)}				(5) AITV_INDI ^{b)}				(6) AITV_FORE ^{b)}			
period	sample	mean	t-value	period	sample	mean	t-value	period	sample	mean	t-value
total	1205	1.4494**	14.37	total	1225	1.5161**	18.71	total	1198	1.2814**	9.80
2005	229	1.5739**	6.87	2005	231	1.7247**	9.75	2005	222	1.4878**	5.50
2006	223	1.6069**	6.19	2006	229	1.6358**	8.78	2006	221	1.2792**	3.80
2007	240	1.3420**	5.61	2007	242	1.4541**	9.00	2007	239	1.2404**	4.41
2008	235	1.2863**	4.46	2008	236	1.3068**	6.27	2008	231	1.1791**	3.18
2009	278	1.4513**	6.89	2009	287	1.4770**	8.36	2009	285	1.2394**	5.04

a) tests whether AI is different from 0.004.

b) tests whether AITV_{INST}, AITV_{INDI}, AITV_{FORE} are different from 1.

Table 5. Market responses before and after the analyst reports announcement dates

This table shows the average market responses to analyst reports (AI, AITV, AITV_{INST}, AITV_{INDI}, AITV_{FORE}) as well as the corresponding t statistics (1) on the announcement dates (D₀), (2) one day before the announcement dates (D₋₁), (3) two days before the announcement dates (D₋₂). Column (4) shows the difference in market response between D₋₁ and D₋₂; column (5) shows the difference in market response between D₀ and D₋₁. *, ** are 5%, 1% significance levels, respectively.

Variable	Event day	(1)	(2)	(3)	(4)	(5)
		-2 day	-1 day	D day	(2)-(1)	(3)-(2)
AI	Mean	0.0041**	0.0044**	0.0052**	0.0003**	0.0008**
	t-stat	(3.077)	(8.263)	(18.197)	(4.546)	(10.898)
	N	1222	1222	1225	1222	1222
AITV	Mean	1.0753**	1.1347**	1.4757**	0.0624**	0.3445**
	t-stat	(4.204)	(6.629)	(18.307)	(2.824)	(13.263)
	N	1198	1203	1207	1193	1196
AITV _{INST}	Mean	1.1848**	1.2185**	1.4494**	0.0360	0.2176**
	t-stat	(6.716)	(9.210)	(13.416)	(1.198)	(7.124)
	N	1198	1194	1205	1188	1188
AITV _{INDI}	Mean	1.0772**	1.1965**	1.5161**	0.1193**	0.3209**
	t-stat	(5.342)	(10.757)	(18.710)	(7.261)	(13.855)
	N	1221	1221	1225	1220	1220
AITV _{FORE}	Mean	1.0854**	1.1098**	1.2814**	0.0214	0.1739**
	t-stat	(3.561)	(5.194)	(9.802)	(.793)	(5.967)
	N	1193	1190	1198	1183	1182

Table 6. Effect of trading behaviors of different investor types on the market response

This table shows the regression results that represents the effect of the trading behaviors of different investor types on the market response. Dependent variables are measures of market responses, AI and AITV. Independent variables are trading volume responses of different investor types; AITV_{INST}, AITV_{INDI}, AITV_{FORE}. Control variables are SIZE, ANALYST, YEAR and ID. *, **, *** are 10%, 5%, 1% significance levels, respectively.

Variable	(1) AI	(2) AITV
	Coefficient (t-stat)	Coefficient (t-stat)
CONSTANT	0.0039 ^{***} (5.74)	0.1315 ^{**} (1.99)
AITV _{INST}	0.0002 ^{***} (2.96)	0.1197 ^{***} (21.32)
AITV _{INDI}	0.0011 ^{***} (14.02)	0.7805 ^{***} (104.20)
AITV _{FORE}	0.0000 (-0.38)	0.0793 ^{***} (13.15)
SIZE	0.0001 (0.65)	-0.0276 ^{**} (-2.18)
ANALYST	-0.0007 ^{***} (-4.61)	0.0346 ^{**} (2.35)
ΣYEAR	Included	Included
ΣID	Included	Included
N	1182	1175
Adj.R ²	0.33	.96
F-stat	26.59	1173.05

Table 7. Effect of firm characteristics on the trading responses to analyst reports

This table shows the results of cross-sectional two-stage least-squares regression models that represent the effect of firm characteristics on the trading responses to analyst reports. We show the time-series means of coefficients based on Model 2, z-statistics for the averages of the coefficients, average adjusted R², average number of samples. We indicate the statistical significance of time-series means of coefficients using adjusted statistics of Newey-West (1987). *, **, *** are 10%, 5%, 1% significance levels, respectively.

Variable	(1) AITV	(2) AITV_INST	(3) AITV_INDI	(4) AITV_FORE
	Mean Coefficient (z-stat)			
CONSTANT	2.3635*** (3.644)	1.8947*** (5.441)	2.6461*** (3.537)	1.0272** (2.188)
FIT_VAR	-0.2534 (-0.331)	0.7143* (1.809)	-0.6203 (-0.758)	-0.2118 (0.237)
FIT_VOL	0.0043 (0.082)	0.0199 (0.700)	-0.0027 (-0.499)	0.0127 (0.760)
SIZE	-0.0999 (-0.814)	-0.1143* (-1.713)	-0.0849 (-0.673)	0.0369 (0.423)
ANALYST	-0.2626*** (-3.525)	-0.2782*** (-2.754)	-0.3080*** (-4.844)	-0.0977 (-0.664)
INSIDER	0.4365** (1.992)	0.2672 (0.867)	0.4419* (2.092)	0.3046 (1.047)
MB	-0.0070 (0.033)	-0.0300 (-0.102)	-0.0047 (0.097)	-0.0292 (-0.041)
ACCRSQ	-0.0174 (-0.913)	-0.0320 (-0.547)	-0.0177 (-0.992)	-0.0017 (-0.698)
MMRSQ	-0.6774*** (-3.420)	-0.0368 (0.049)	-0.9162*** (-3.548)	-0.6621 (-1.213)
IND_R	0.6530 (1.401)	0.1634 (0.852)	0.7507* (1.814)	0.3923 (0.950)
GNEWS	0.1942*** (3.242)	0.1556 (1.624)	0.2046*** (3.275)	0.0989* (1.719)
ADVER	-3.0900*** (-7.212)	-1.4154 (-0.684)	-3.2064*** (-4.770)	-3.0804** (-2.539)
TOA	0.3308 (0.528)	3.6358 (1.218)	0.3370 (0.551)	0.2965 (0.296)
DEBT	-0.2430* (-2.315)	-0.3294* (-1.731)	-0.3623*** (-4.402)	-0.0374 (-0.415)
N	193.0	192.2	194.2	191.6
adj.R ²	.145	.083	.157	.035
F-stat	3.650	2.467	3.872	1.606

Table 8. Effect of analyst characteristics on the trading responses to analyst reports

This table shows the regression results of Model 3 which represents the relationship between the trading responses of each investor type and the characteristics of the consensus forecasts. The dependent variables are (1) AITV, (2) AITV_{INST}, (3) AITV_{INDI}, (4) AITV_{FORE}, respectively. We use as analyst forecast characteristics target price discrepancy ratio (TPDR), the coefficient of variation of the target price (TPCV), investment recommendation score (IRS), change in investment recommendation score (Δ IRS) to study the effect of characteristics of the consensus forecasts on the trading responses of each investor type. We use as control variables the statistically significant those factors of trading volumes of all investors, which are shown in Table 7. In order to reduce heteroskedasticity we use separate year regressions. We show the time-series means of coefficients based on the cross-sectional OLS regression models, z-statistics for the averages of the coefficients, average adjusted R², average number of samples. We indicate the statistical significance of time-series means of coefficients using adjusted statistics of Newey-West (1987). *, **, *** are 10%, 5%, 1% significance levels, respectively.

Variable	(1) AITV	(2) AITV _{INST}	(3) AITV _{INDI}	(4) AITV _{FORE}
	Mean Coefficient (z-stat)			
CONSTANT	1.0270* (2.227)	0.8049 (1.067)	1.3408*** (3.940)	0.9537 (1.252)
TPDR	0.3208*** (2.871)	0.2700* (1.847)	0.3357*** (2.697)	0.0167 (1.067)
TPCV	-0.2885 (-1.227)	-0.2995 (-0.733)	-0.5861* (-1.784)	0.3140 (0.269)
IRS	0.1885* (1.837)	0.2469 (1.328)	0.1627* (2.414)	0.0332 (0.319)
Δ IRS	0.0088 (1.106)	0.0159** (2.135)	0.0070 (0.754)	-0.0080 (-1.009)
ANALYST	-0.3695*** (-10.468)	-0.4266*** (-5.819)	-0.4330*** (-8.980)	-0.0724 (-1.570)
INSIDER	0.2518*** (5.422)	0.1246 (1.300)	0.2642*** (4.313)	0.3052*** (4.433)
MMRSQ	0.2561*** (2.996)	0.6828*** (3.019)	0.2341*** (1.883)	0.1264 (0.656)
ADVER	-1.3559* (-2.142)	-0.6623 (-0.704)	-1.4301* (-1.771)	-0.9627* (-1.863)
DEBT	-0.1655* (-2.159)	-0.1716** (-2.679)	-0.2616*** (-3.704)	0.0443 (-0.093)
N	185.0	185.0	185.4	185.2
adj.R ²	.167	.101	.187	.024
F-stat	5.271	3.377	5.764	1.663