

Market Imperfections and Regulatory Intervention: The Case of Insider Trading Regulation in the Indian Stock Market*

Yogesh Kumar Chauhan

ICFAI Foundation for Higher Education

Kiran Kumar Kotha

National Institute of Securities Markets

Vijaya B. Marisetty**

Department of Economics, Finance, and Marketing, RMIT University

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**Corresponding author. Level 11, Building 80, 445 Swanston Street Street, Melbourne, Australia -3000. Tel: +61 3 99251431. E-mail: vijayabhaskar.marisetty@rmit.edu.au

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Abstract

This paper's aim is two-fold. First, to investigate whether regulatory intervention, to improve insider trading transparency, leads to higher information production. Second, to understand how market imperfections can distort uniform impact expected out of regulatory intervention. We use Indian stock market regulator-SEBI's regulatory intervention on insider trading as a natural experiment for our investigation. Using 9383 insider trades, that occurred between 2007 to 2009, we report the following main findings: (1) Our estimates show that, Firm Officers, on average, made around Rs.4 profit per share more than ordinary shareholders for every round trip transaction during pre-regulatory intervention period. Regulatory intervention reduces such profiteering activity. (2) Regulatory intervention significantly improved information production associated with insider trades. (3) Market imperfections in the form of variations in firm organisation structure and competition environment, can explain lack of uniform impact due to regulatory intervention. Our results leads us to conclude that regulatory intervention is generally effective (Brochet, 2010), however the efficacy cannot be uniform unless regulatory intervention goes hand-in-hand with regulatory investment and coordination aimed at addressing market imperfections (Fernandes and Ferreira, 2008).

JEL Classification: G23 .

Keywords: Insider trading; Product market competition; Business Groups; SEBI.

I Introduction

Insider trading has been quite rampant in the recent past.¹ Regulatory efficacy is often questioned when insiders are caught while exploiting private information through insider trading. Existing studies report mixed evidence on regulatory efficacy through insider trading regulation (Seyhun, 1986, Lakonishok and Lee, 2001 and Brochet, 2010). Emergence of new cases of insider exploitations, even under tight insider trading laws, resonates the mixed empirical evidence in the literature. It also highlights limitations of regulatory intervention and questions the uniformity of regulatory efficacy (Seyhun, 1992). One reason for regulatory inefficiency could be the costs associated with having discretionary regulation. Monitoring each firm is not only costly but also not practical and hence regulator imposes standard rules that are sub-optimal.² Another plausible reason could be lack of coordinated regulatory effort among regulatory agencies. For instance, Indian stock market regulator, SEBI, has been struggling since 2009 for seeking permission from Indian telecommunications regulator to tap telephone calls of suspected insiders. However, lack of regulatory coordination between the two regulators has crippled SEBI's regulatory efficacy.³ Hence, regulatory intervention in an environment with market imperfections may not yield uniform information production. Understanding the impact of barriers of information production associated with market imperfections can help regulatory policy on regulatory investment and coordination. Fung et al., (2003) note that regulatory effort to improve transparency fades without vigilant and well-funded enforcement efforts.

Fernandes and Ferreira (2009) find that enforcement of insider trading laws around the world depends on country's level of development and the quality of legal institutions. Insider trading regulations are relatively more effective in developed markets compared to emerging economies. This evidence highlights the impeding role of market imperfections on information dissemination

¹Preet Bharara, the U.S. attorney for the Southern District of New York, in his speech to the New York Bar Association in October 2010, said that (despite having stringent insider trading laws for so many years in the US economy) insider trading is rampant and may even be on the rise. And the people who are cheating the system include bad actors not only at Wall Street firms, but also at Main Street companies.

²Deb et al., (2010) theoretically show that standard rules can be optimal in some settings. Especially, when the costs of monitoring is too high, regulators in stock exchanges are better off imposing uniform price limit rules even though such rule is not desirable and can have adverse impact on firm's information production.

³The usage of wire tapes to catch Rajarathanam in Goldman Sachs case has been effective but its implementation can be quite challenging. Economic Times, India's largest circulating finance news paper made the following revelation in the recent past: *"The Indian stock market regulator - SEBI had in 2009 sought permission to tap phones but the Indian Department of Telecommunications had denied the request saying that the market regulator was not in the designated list. The regulator had a year back again written to the Finance Ministry seeking access to telephone calls made by those it suspected of violation of securities laws. The government, weary over the leaked conversations relating to telecom scandal, had not acted on the request."* (Source: Economic Times, 3-8-12)

process and corresponding exploitation by insiders. However, to our knowledge, there is no study that investigates the potential impact of market imperfections, in the form of structural irregularities, on information production during regulatory intervention on insider trades. Insider trading, being a credible source of information production, provides a natural setting for investigating the interaction between market imperfections and regulatory intervention.

We focus on the efficacy of insider trading regulation by the Indian stock market regulator, Securities Exchange Board of India (SEBI). SEBI intervened by making three important changes that are related to definition of insider, restriction on short-swing transactions and timeliness of reporting insider trades. Effective from 19th November 2008, SEBI broadened the scope insiders to cover more parties related to insiders. They extended round trip or short-swing transactions restrictions from one month to six months. And they improved timeliness of insider trading reporting from 5 days to 2 days. Unlike other regulators (see Brochet, 2010 and Fidrmuc et.al., 2006) SEBI imposed all the three changes at the same time for higher effectiveness. Short-swing transaction allow insiders engage in round trip transactions in a short window of time.⁴ Insiders, due to their informational advantage, have the ability to time purchases before the public announcement and sales after the public announcement of sensitive information. Likewise, broadening the scope of insider definitions would reduce insider trading as the chances of disguised trading activity reduces. Also, shortening the reporting timeliness would improve information efficiency of stock price. Post-regulatory intervention, insider trades, especially their purchases are expected to produce more information due to improved transparency on their trading intention. SEBI substantiated imposition of such regulation on the grounds that it aligns the interests of insiders with the long term interests of the shareholders. This implies that improved alignment would result in higher information production for insider trades. Hence, we consider SEBI's regulatory intervention as a natural experiment to understand the effects of regulatory intervention on information production.

We address the question of uniformity of regulatory impact by examining how market imperfections in the form of market and firm level structural irregularities can distort uniform information production. Our focus is mainly on two market imperfections that are potentially connected to regulatory investment and regulatory coordination. One is specific to emerging

⁴One recent example of such activity is the celebrated insider trading case where Rajarathinam, a hedge fund manager, was caught by the US market regulator SEC, for making a quick round trip transaction while trading on Goldman Sachs stock before their public announcement of Warren Buffet's purchase of Goldman Sachs stock.

markets, where many firms organise themselves as groups due to institutional voids associated with emerging markets (Khanna and Palepu, 2000). Firms affiliated to business groups tend to be more opaque (Dewenter et.al., 2001) and have information leakages due to complex intra-group transactions (Bertrand et.al., 2002). Thus, group affiliated firms are expected to have lower information production, compared to a similar standalone firm in the same market. Given that regulatory investment to monitor the complexity associated with business group firms is limited we expect firms with business group affiliation should reflect lack of regulatory effectiveness with lower information production compared to standalone firms. The second market imperfection is related to product market competition as reported by Peress (2010). Competitive markets require regulatory coordination. Baron (1999) shows that firms lobby not only because of the direct effect regulation has on profits, but also to improve their competitive advantage compared to rivals, who might be less able to comply with the requirements imposed by the authorities. In other words, firms can exploit regulatory arbitrage that might arise due to lack of regulatory coordination. We use variation in market power among firms to capture market imperfection due to limits of regulatory intervention and coordination. Peress (2010) argues that market imperfections related to firm level competition can lead to asymmetric information production. Firms that have high market power tend to have lower earnings shocks due to less competition and hence produce more information compared to firms that have low market power. Peress (2010) also shows that insiders of high market power firms trade more compared to insiders of low market power firms. It is important to note that, emerging markets have significant variation in product market competition due to their early stages of development and government restrictions on market entry. In summary, these two barriers reflect both firm level (groups versus standalones firms) and market level (product market competition) structural irregularities. Our objective is to understand whether regulatory intervention for improving information production is uniformly felt among these heterogeneous groups of firms. In otherwords, we explore the possible resistance of market imperfections to regulatory intervention.

For regulation that is aimed at improving transparency and corresponding information production, to be effective and sustainable, it has to not only increase overall information production but also its effect has to be uniform across all firms in the market. However, we argue that achieving latter objective is more challenging especially when there is no coordinated effort to address market imperfections. Firms that are more transparent will be more sensitive to regulatory intervention compared to firms that are less transparent. Not only that, even if firms, that are less transparent, equally abide by regulation, investors of such firms may underact to their in-

formation production due to perceived information leakages associated with less transparency (Bertrand et.al., 2002). Hence, we expect that information production due to regulatory intervention may not be uniform across all firms in the market.

Our study joins several streams of literature by focusing on the effect of increase in regulatory effort (similar to Brochet, 2010) on information production during insider trades, however, after controlling for market level structural irregularities (similar to Peress, 2010) and firm level structural irregularities (similar to Fidrmuc et al, 2006). Our contribution mainly comes from three sources. First, to our knowledge, ours is the first study to examine the efficacy of short-swing profits regulation. Second, our study provides new evidence relating to the impact of structural barriers on the efficacy of regulation intervention. Third, by focusing on market imperfections, our research can shed some light to reconcile the mixed evidence in the literature.

Using a proprietary dataset, provided by the National Stock Exchange of India, that contains 9383 open market insider trades that happened during 2007- 2009 we report the following main findings: 1. We first estimate the average profit per share made by insiders through short-swing profits during one month regulatory restriction period (year 2007). We find that, on average, a firm officer insider (large shareholder insider) trade results in Indian Rupees- Rs. 4 (1) per share more profit compared to random one month round trip trade during the same period. This result highlights two things. First, regulatory effort is not adequate to reduce insiders exploitation of information. Second, it clearly provides the rationale for regulatory intervention. 2. Consistent with the existing literature (Brochet, 2010), regulatory intervention significantly increases information production of insider purchases and significantly decreases for insider sales. Our results based on propensity score matching method confirm the increase in information production can be attributed to regulatory intervention. 3. Consistent with the product market competition literature (Peress, 2010), information production is significantly higher for firms with low production market competition. Also, consistent with the ownership structure literature (Fidrmuc, 2006), information production is low for group affiliated firms compared to standalone firms. 4. Finally, we find that the improvement in information production due to regulatory intervention is not uniform. Post-regulation improvement in information production is mainly seen in standalone firms and not in group affiliated firms. This highlights the limits of regulatory intervention.

In summary, we provide comprehensive evidence to improve our understanding the role of information production, information dissemination, and regulatory intervention on asset prices in

emerging markets with significant market imperfections. Our evidence suggests that regulatory intervention improves overall information production; however, the results are not uniform across firms. Market structure and firm organisational structure influence the quantity and quality of information production. Hence, our results support Fernandes and Ferreira (2008) findings that regulatory intervention should go hand-in-hand with regulatory investment on information production.

The rest of the paper is organised in five sections. Section two, which follows this Section, provides some background information on short-swing profits prohibition regulation and also presents some preliminary results on the extant of short-swing profits⁵. Section three develops our main hypotheses. Data and methodology are reported in Section four. Section five reports our results. Section six concludes.

II Short-Swing Profits and Regulation

1. Short-swing profits regulation

Section 16 (b) of Securities Exchange Commission Act 1934 in the US market defines short-swing profits as any profits realized by an officer or director (or beneficial owner of more than 10 percent of any class of equity securities of a publicly traded corporation) from a non-exempt purchase and sale, or sale and purchase of any equity security of such company occurring within a six-month period. There have been many cases of violation to this rule in the US market.

Indian stock market regulator, SEBI, as part of improving corporate governance standards, expressed its interest to regulate insider trading in January 2008. Later, the actual regulation was passed in November 2008. The new regulation is similar to Section 16 (b) of Securities Exchange Commission Act 1934 in the US market. The regulation imposes restriction on sale and purchase of stocks (round trip) by insiders within a six-month period. Such a regulation, as per SEBI, will check insiders, who have access for price sensitive information, from taking advantage of information for the purpose of making short term profits. This regulation replaces

⁵For brevity, we focus mainly on short-swing profits regulation for three reasons. First, regulatory intervention through short-swing profits is more direct compared to broadening definition and improving the timeliness of reporting. Second, the other two are complementary to short-swing profits regulation. Third, there is no evidence on short-swing profit regulation. However, there are already few studies on improving the timeliness and types of insiders (See Brocheet, 2010)

less stringent one-month restriction on insider round-trip trades. Also, as part of the regulation, SEBI also made amendments to the definition of insider by broadening it to all directors of the company, all firm officers, all beneficial owners directly or indirectly own 10 percent or more of any class of equity securities. With this regulation in place, SEBI expects long term interests of the shareholders will be aligned with that of insiders.

2. The extant of short-swing profits

Although there are many incidences of violations relating to short-swing profits regulation there is no clear idea on the extant of short-swing profits. Understanding the extant of short swing profits is important for at least two reasons. First, for policy making, the extant of short swing profits can help to ascertain net benefit of regulation. Second, apart from celebrated cases in the US, there is no existing evidence on the extant of swing-profits. It is not clear whether there is a systemic failure.

Table 1 reports trades made by firm officers and large shareholders (with equal to or more than 10 percent equity) in 1156 stocks. We calculate average buy and sell price difference for all insider trades of each firm that occurred within one month during the pre-regulatory intervention period. We repeat the same exercise for six month window during the post-regulatory intervention period. The change in the time window reflects regulatory restriction during the pre and post regulatory intervention period. These price differences are aimed to capture insider trading profits.⁶ In order to capture ordinary shareholders potential profit or loss during the same period, we create several random holding periods for the 1156 stocks. We calculate average buy and sell price difference of each holding. As per the table, there are 170 firm officers who, on average, made Indian rupees Rs. 6.46 profit per stock and 77 large shareholders who made Rs. 3.54 profit per stock. The final row reports price difference of average one month holding period profits based on several randomly generated one month holding periods for the year 2007. We use these random holding periods as proxies for ordinary investors who have invested during the same period. The Table shows that, the average price difference of 10514 random generated

⁶It is important to note that these are not round trip trades of each individual Firm officer or Large shareholders. The price differences are based on collective trades in each firm by all Firm officers or Large share holders. Hence we cannot attribute these profits directly as insider profits. There is every chance that the same insider may not be involved in buy and sell transactions. However, if their trading is random then the expected profit should be zero. We compare these insider round trip transactions with random holding period returns to see whether the insider trades are really random.

holding periods is Rs. 2.63. This implies that firm officers made, on average, Rs. 4 more than an average ordinary investors invested during the same period. This suggests that, even with one month restriction in place, firm officers potentially made significant profits. The table also depicts potential short-swing profits after regulatory intervention through extending restriction on round trip transactions to six months. We calculate price difference during six months in the post-regulation period (year 2009). As shown in the Table, Firm officers and Large shareholders still engage in round trip transactions. However the number of Firm officer trades are relatively lower in the post regulatory period. There are 106 firm officers during year 2009 where their average profit per share is Rs. 1.79. This amount is significantly lower compared to pre-regulatory period. The average per share profits are Rs. -1.23 and Rs. -18.11 for 146 large share holders trades and 9524 randomly generated 6 month holding period price differences respectively. The results support the rationale behind regulatory intervention.

Table 2 reports regression results aimed at capturing the probability of insider trades yielding positive returns. The dependent variable takes value 1 if a given insider round-trip trade yields a positive price difference or profit, otherwise 0. We control for firm size (total assets), firm performance (Return on assets) and trading activity (Amihud's illiquidity measure). We also control for market imperfections in the form of firm and market structural differences related to product market competition and business group affiliation. The results in Table 2 show that, Firm officer dummy, that takes value 1 if the trade is initiated by a firm officer insider otherwise 0, is positive and significant. This result confirms that insiders, mainly firm officers, have higher probability of making profits during the pre- short swing profits regulation period. This result justifies the rationale for extending regulatory restrictions on insider trades. We repeat the regression analysis for post regulatory intervention period. The results are reported in the last two columns of Table 2. The results indicate that Firm officer dummy is not significant. This indicates that regulatory intervention has been relatively effective as Firm officers do not have higher probability of generating positive returns in the post regulatory intervention period.

In summary, the above discussion clearly indicates that insider trades are not random and they have higher probability of profiteering. Regulatory intervention has the potential to restrict such exploitation. This evidence motivates us to understand the deeper implications of regulatory intervention in terms of information production and uniformity of regulatory intervention efficacy.

III Hypotheses Development

1. Regulatory intervention and information production

Regulatory intervention aimed at improving transparency is generally considered to produce new information that can benefit investors. In a broad context, Angeletos and Pavan (2004) theoretically show that, with an increase in either the relative or the absolute precision of public information welfare unambiguously increases.⁷ Hence, policies that either disseminate more precise information about economic fundamentals, or reduce the heterogeneous interpretation of economic statistics and policy measures, necessarily boost welfare.

In the context of insider trades, Huddart et al. (2001) show that public disclosure of insider trades accelerates price discovery compared to the no-disclosure benchmark model of Kyle (1985). However, the initial evidence aimed at empirically testing this hypothesis did not strongly prescribe to the idea that regulatory intervention improves information production during insider trades. Lakonishok and Lee (2001) find statistically but not economically significant mean market-adjusted returns over a five-day window starting on insider trade filing dates, irrespective of book-to-market ratio and size (about 0.13percent for purchases and -0.23percent for sales). Aboody and Lev (2000) find more positive (negative) raw returns and higher trading volumes following filings of insider purchases (sales) in firms with RD activity versus others, but the returns remain low on average. However, evidence in the recent past based on more targeted regulation such as Form 4 filings timeliness in the US market has provided strong support for this hypothesis. Brochet (2010) find that the improved timeliness for filing insider trades as part of Sarbenes Oxley Act of 2002(SOX), Form 4 requirement, significantly improves information production. Over a three-day window starting on the receipt of the form by the SEC, the mean cumulative abnormal returns are 0.63% and 1.89 % pre- and post-SOX. The results in terms of returns around filings of insider sales do not appear to be consistent with the contention that Section 403 of SOX increases their information. Brochet (2010) argues that the impact of the increased timeliness of Form 4 filings on contemporaneous short-window returns is potentially confounded due to decrease in informed trading and greater disaggregation of filings is severe for sales than purchases. Seyhum (1998) also finds that such regulation would affect insider sales more than purchases because sales tend to be larger than purchases.

In our case, regulatory intervention was mainly aimed at restricting short term profiteering of

⁷This holds where there is no value for lotteries.

the insiders and improving transparency. This implies that insiders will be more cautious while trading to avoid penalty and loose reputation. Hence, public information associated with insider trades announcement will be less noisy and more transparent on insider intentions of trading. Thus the regulation has the potential to improve the information production of insider trades and also reduce the profiteering behaviour of insider trades. We expect that these potential changes would reduce insider sales during the post-regulation period. Also, the information content of insider trades increases for purchases and decreases for sales. Based on this discussion, we formulate our first hypothesis as follows.

H1: Insider trades announcements will result in higher information production in the post-regulatory intervention period. However, purchases will experience higher information production compared to sales.

2. Uniform impact of regulatory intervention

Regulation, to be effective, needs to have uniform impact. However, it is quite challenging for regulators to achieve uniformity due to market heterogeneity. Damodaran (2006) argues that while differences in accounting standards across countries was viewed as the primary culprit for lack of transparency until recent years, the convergence in accounting standards globally has made it clear that no matter how strict accounting standards are, firms will continue to use their discretionary power to spin and manipulate the numbers that they convey to financial markets. He goes on to note that differences in transparency across countries can be best explained by differences in accounting, regulatory and political environments, but there are also significant differences across companies within any country. These differences can be best explained by how the firm is structured, the businesses it operates in and how it exercises its discretionary power within existing accounting rules. Thus it is important to understand how market imperfections in the form of firm level and market level structural differences can affect the uniformity of regulatory intervention. Fung et al. (2003) note that, without constant political oversight, careful attention to the benefits and costs surrounding disclosers and users, awareness of the impact of changes in the market and regulatory environments surrounding the disclosure system, and vigilant and well-funded enforcement efforts, the disinfecting power of disclosure soon fades. This clearly indicates that significant coordination effort is inevitable for regulatory efficacy.

We mainly focus on two important firm level and market level structural differences. We are mainly guided by the existing research that links structural differences to information production. The first one is related to firm organisational structure mainly in emerging markets. Khanna and Palepu (2000) find that it is optimal for firms to organise as complex groups in order to overcome institutional voids that challenge firm survival. However, later research revealed that such complex structures facilitate controlling owners' power to exercise their private benefits of control and tunnel funds from minority shareholders. Bertrand et al., (2002), using Indian business groups data, show that due to such tunnelling activities, investors underreact to group firms' announcements. Dewenter et.al., (2002) report that business structures in Japan are more opaque in their information disclosure and hence their IPOs are underpriced significantly higher than standalones. Marisetty and Subrahmanyam (2010) report similar evidence in the Indian market. Bae, Kang and Lee (2006) report similar underreaction is common to Korean business groups during their merger announcements. Rao et al, (2009) report similar instances of tunnelling exploitations among Chinese business groups. In summary, group affiliation results in lack of transparency and information leakages. Hence, for a given public information announcement, the information production of a group affiliated firm is expected to be less compared to a comparable standalone firm.

We expect that regulatory intervention will have minimal impact to reduce the information production gap between groups and standalone firms for two important reasons. First, short swing profits regulation is not a coordinated effort. Unless regulatory effort is coordinated through improving disclosure practices of business groups or dismantling group structures the impact of regulatory intervention will be insignificant for business groups. Second, even if insiders of business groups become more diligent and convey credible information, group structural dynamics will still create barriers for investors to clearly interpret the information released due to lack of coordinated effort. With no changes (in the post regulation period) to the complex cross holdings among group firms and the prevalence of private benefits of control for the controlling owners investors discounts the information content of insider trades of business groups affiliated firms. This brings us to our second hypothesis as follows.

H2: We expect significant difference in the information production due to insider trades between business group affiliated firms and standalone firms. In the post-regulatory intervention period, the information content improves mainly for standalone firms and not for the business group affiliated firms.

Our second market imperfection is mainly guided by Peress (2010). Peress (2010) develops a theory on the role of product market imperfections on information production. In an emerging market context, barriers to trade and entry impedes product market competition and their effects flow into equity prices. Peress (2010) shows that firms enjoying more market power are associated with less dispersed earnings and productivity forecasts, larger trading volume by informed traders, higher stock liquidity and more informative stock prices. Their improved informativeness leads to lower expected returns even after controlling for risk, and lower idiosyncratic return volatility. When firms raise fresh capital in the stock market, the effects are not only financial but also real. The model implies that capital is more efficiently allocated when firms enjoy more market power. Thus, product market imperfections, rather than spreading to equity markets, tend to limit stock market imperfections. That is, monopoly power in product markets reduces informational and allocative inefficiencies. In summary, firms with high market power produce more information compared to firms with low product market power. Gaspar and Massa (2005) also find that analysts' dispersion is less for high product market competition sectors.

In our context, the implication of the model proposed by Peress (2010) is that information production should vary between firms operating in high and low product market competition sectors. And regulatory intervention may not bridge the information production gap between low and high product market competition firms. This leads us to our final hypothesis as follows.

H3: We expect information production due to insider trades should vary across firms based on their market power. Firms with higher market power should have more information production compared to firms with lower market power.

IV Data and Methodology

We use a proprietary data set on insider trades provided to by the India's largest stock exchange, National Stock Exchange (NSE) of India. The dataset contains 18,276 insider transactions reported for all listed firms in NSE for the period between January 1, 2007 to December 31, 2009. Given that the regulation was introduced for public discussion during January 2008 and later imposed during October 2008, we exclude 2008 for pre and post regulation comparison. Hence, our pre-regulation period is year 2007 and the post-regulation period is year 2009. The dataset covers

company name, individual insider name, mode of trade (market transactions, ESOPs and gifts etc.) side of trade (purchase or sale), number of share traded, and date of intimation to company and date of announcement to the stock exchange. Since in this study, we study those trades that are encouraged by the special information, we exclude stocks acquired by the exercise of options or through compensation plan (ESOPs), gifts, and private sales. Moreover, under SEBI prohibition of insider trading regulations 1992 Regulation 13(1) and 13(2), every listed firm's directors and shareholders are required to disclose their interest or holding as an initial disclosure. As these kinds of disclosure of interest or holding are not an outcome of open market trading, they are not considered for analysis. Also, the short-swing profits regulation does not cover employee stock options.

1. Descriptive statistics

For the sample period, 9,383 open market transactions are obtained, which consist of 6,063 purchases and 3,320 sales as summarized in Panel A of Table 3. Seyhun (1986) estimates that for the U.S, a ratio of insider buys to insider sales is around 0.67, whereas, for our sample period, we find a ratio of insider buys to insider sales is around 1.83. Our statistic is more inline with the UK market than US market (Fidrmuc et al., 2006).

Panel A also reports the frequency distribution of insider trading activities by firm size. Consistent with Finnerty (1976) and Rozeff and Zaman (1998), insiders are net buyers in small firms, whereas, insiders are net sellers in large firms. De Bondt and Thaler (1985, 1987) find that a portfolio that has long position in past loser stocks and short position in past winner stocks can yield abnormal returns.⁸ They advocate that this abnormal return is an outcome of stocks mispricing.⁹ If we assume corporate insiders have superior information then they take advantage of mispricing in their stock. Thus, they would be net sellers in growth firms and net buyers in value firms (Rozeff and Zaman, 1998). Statistics based on Panel B of Table 1 indicate that, on average, the intensity of insider purchases (sales) is greater in firms with low Price to book or PB ratio (High PB ratio) than high PB ratio (low PB ratio). For example, purchases to sales ratio is 5.55 in low PB ratio firms, whereas buy to sales ratio in high PB ratio firms is .82. Since, growth firms' executives tend to receive more stock based compensations, the large insider sales

⁸Joshipura(2009) also find similar results from Indian stock market.

⁹Lakonishok et al. (1994) state that these extreme past returns behavior can be estimated from fundamental ratios such as Price to Book value ratio.

in growth firms may be a result of stock-based compensations (Graver and Graver, 1995, Bizjak et al, 1993, Meulbroek 2000, and Ofek and Yermack, 2000).

Insider trades classified on the basis of type of insider viz. Firm officers and Large shareholders are reported in Panel C of Table 1. The number of insider trades (either purchase or sale) is much higher for Firm officers as compared to Large shareholders. Consistent with information hierarchy hypothesis, Firm officers are more insiders than Large shareholders and hence they have more trades than shareholders. Panel D reports the insider trades classified based on firm organisation structure. It is important to note that insiders of standalone firms purchase more stock than business group affiliated firms. Given that purchases are more informative than sales; this implies that insiders of standalone firms produce higher information compared to business group counterparts. Panel E reports insider trades classified based on firm product market power. The insider buys as a proportion of total trades are more for firms with high product power. This result is consistent with Peress (2010).

2. Descriptive statistics: regulatory impact

Table 4 reports descriptive statistics of insider trading and firm specific variables by dividing the sample into before and after regulatory intervention. The data on insider trading activity is mainly captured in terms of insider traded size as a proportion of total shares traded and value of insider trades. The table shows that, both in terms of mean and median trade size and value, trading activity significantly decreases in the post-regulation regime. This result is consistent with Seyhum's (1992) theoretical underpinnings on the role of regulation on insider trading. Seyhum (1992) predicts that an increase in sanctions will reduce the positive relationship between insider private information and number of shares traded by the insiders. Amihud's illiquidity measure and price to book ratio indicate that market in general, during the post regulatory period, has become inactive with higher illiquidity and lower stock valuation. This cannot be attributed to general slowdown due to Global Financial Crisis as Indian market recovered significantly during year 2009. Also, our measure of trading activity is relative to the total shares traded. Hence, the result clearly indicates that insider trading activity reduce after regulatory intervention.

V Results

1. The information content of insider trading

Tables 5 and 6 report abnormal returns (ARs) and cumulative abnormal returns (CARs) during insider trading event period. To measure abnormal returns, we assign stocks to one of 25 Fama-French portfolios resulting from the intersection of five portfolios based on market values of equity (size) and five portfolios based on book-to-market value of equity ratios. We subtract portfolio returns from individual stock returns to obtain daily abnormal returns.¹⁰ Table 5 reports results for insider purchases and Table 6 reports results for insider sales. Both tables report results in 4 panels. Panel A reports abnormal returns for before and after regulatory intervention. Panels B to D report abnormal returns by dividing the total sample into sub-samples based on type of the trades (Firm officer or Large shareholder), firm organisational structure (Group affiliated firm or Standalone firms) and firm product market competition (High competition firms and Low competition firms) respectively. This sub-division helps to conduct preliminary tests on our stated hypotheses.

Panel A shows that the average abnormal return on the announcement day is positive but significant mainly in the post-regulatory intervention period. And the cumulative abnormal return is higher in the post-regulatory intervention period compared to the pre-regulatory intervention period. This result is consistent with Brochet (2010) on regulatory intervention to improve transparency during insider trades. Similar to Brochet (2010), this result indicates that the average information production improved with regulatory intervention in the Indian market. Panel B shows that, when insider trades are divided into trades by Large shareholders and Firm officers, the CAR of Firm officer trades is significant and higher than Large shareholders in the post-regulatory intervention period. This indicates that the regulatory intervention to restrict the short-term profiteering on insiders and improving the transparency of insider trading intentions has been effective for Firm officer trades.

Panel C reports insider trades of business group affiliated firms and standalones firms separately. As per the results, the information production for standalone firms with CAR(0, 5) 2.08 %, is significantly higher than group affiliated firms CAR(0,5) of 0.8 %. This result indicates that the average information production varies between firms based on their organisational

¹⁰We also use market -adjusted abnormal returns and the results are qualitatively same the results based on Fama-Frech factors.

structure. Standalone firms tend to have less informational leakages compared to business group affiliated firms. This is understandable given the complex structure of business groups with several information linkages between several listed firms information leakages are more susceptible. It is important to note that post-regulatory intervention the differential information production between business groups firms and standalone firms still exists. However, there is an increase in the information production for business group affiliated firms. This indicates that regulatory intervention improves information production albeit market imperfections still plays a significant role on the quality of information production.

Panel D reports insider trades by dividing the sample firms based on firm product market power as low and high market power. As discussed in Section 3, Peress (2010) predicts that firms with high market power, with their stable demand and less revenue shocks tend to produce more information than firms with low market power. Consistent with this prediction, Panel D reports significantly higher CAR (0,5) for firms with high market power or with low product market competition (2.61 %) compared to firms with low market power or with high product market competition (0.9%). Panel D results during post-regulatory intervention period resonated Panel C results. Differential information production prevails after regulatory intervention. In summary, results based on both both market imperfections reflect limits of regulatory intervention.

Table 6 reports information content of insider sales in a similar format as insider purchases reported in Table 5. Insider sales results generally support that information content of Firm officers and Standalone firms is higher than Large shareholders and business group affiliated firms. However, in terms of regulatory intervention effect, the information production for insider sales significantly drops down during post-regulatory intervention period. Although we have no clear explanation for this phenomenon, Brochet (2010) and several other studies reported reduction in the announcement day returns in the post-regulatory environment. Brochet (2010) attribute such reduction to insiders' avoidance of timing their sales ahead of bad news in the post regulatory environment. They attribute this result to the reduction in the opportunistic behaviour of insiders. In our case, we attribute the reduction in the information content of insider sales to reduction in the sales related to profiteering round trip transactions of the insiders. In the case of product market competition sub-group, we find that the results contradict our hypothesis. Firms with low market power produce high information production. However, post-regulatory intervention we find no significant difference between the two subgroups.

2. Multivariate Analysis

In order to gain more insights, we investigate the effect of regulatory intervention using multivariate analysis. Our main objective is to see whether regulation has improved information production due to possible increase in the information relating to the intent of insider trades. Table 7 reports regression results based on following Regression Equation (1).

$$\begin{aligned} \text{CAR}(0,5)_{j,t} = & \text{constant} + \beta_1 * (\text{Firm size})_{j,t} + \beta_2 * (\text{P/Bratio})_{j,t} + \beta_3 * (\text{ROA})_{j,t} + \beta_4 * (\text{Amihud Illiquidity ratio})_{j,t} \\ & + \beta_5 * (\text{Regulation Dummy})_{j,t} + \beta_6 * (\text{Firm officer trade Dummy})_{j,t} + \beta_7 * (\text{Business group affiliation Dummy})_{j,t} \\ & + \beta_8 * (\text{Low Product Market Competition Dummy})_{j,t} + \beta_9 * (\text{Firm officer trade Dummy} * \text{Post} - \\ & \text{Regulation period})_{j,t} + \beta_{10} * (\text{Business group affiliation Dummy} * \text{Post} - \text{Regulation period})_{j,t} + \\ & + \beta_{11} * (\text{Low Product Market Competition Dummy} * \text{Post} - \text{Regulation period})_{j,t} + \varepsilon_{j,t} \quad (1) \end{aligned}$$

The Regression Equation (1) aims to capture the determinants of the information content of insider trades. We use CAR(0,5) as the dependent variable to measure the insider trading information content. We use firm size (total assets), price to book ratio, return on assets and Amihud illiquidity ratio as control variables for firms specific characteristics. Our main focus is on the Regulation Dummy that take value 1 for post-regulatory intervention period (year 2009) and 0 for pre-regulatory intervention period (year 2007). Also, we focus on interaction between regulatory intervention and market imperfections through interaction variables. Beta coefficients β_{10} and β_{11} capture the sensitivity of market imperfections to regulatory intervention.

We also capture Firm officer trading activity during pre and post regulation period through *Firm officer trade Dummy*Post-Regulation period* interaction variable. The results in Table 7 show that Regulation Dummy coefficient is positive and significant. This indicates that regulation has improved the information content of the insider trades. Consistent with the univariate results in Table 5, the multivariate results indicate that information content of standalone firms and low product market competition firms are higher than group affiliated firms and high product market competition firms. These are captured through standalone firms and low product market competition dummies. Likewise, Firm officer trades dummy variable indicates that the information content of firm officer trades is higher than large shareholders traders.

The results drastically changes after controlling for firms specific variables and introducing interaction variables. We use interaction variables to capture the effect of regulatory intervention on market imperfections. We find that, in the full model, information production varies significantly only for market power dummy. And firm officer trades improvement in information production is mainly attributed to regulatory intervention. In the case of insider sales we find no significant results.

3. On the Uniformity of Regulatory Intervention

The results in Table 7 indicate that regulatory intervention has improved information production due to Firm officers purchases. However it is not clear from Table 7 whether such improvement is uniform across all subgroups. We further investigate this phenomenon through sub-sample analysis. We run the regression as described in Equation (1),for insider purchases, on the sub-samples of standalone firms, business groups, low product market competition and high product market firms. The results are presented in Table 8. The results in Table 8 show that, among all the sub-groups, only standalone firms had the impact of regulatory intervention. The information content for the standalone firms has significantly improved in the post regulatory intervention period. However, for other groups there is no significant impact of regulatory intervention. This indicates that regulatory intervention was ineffective across all groups. The regulatory intervention was effective only for standalone firms. These results clearly demonstrate the role of market imperfections on information production. The insignificant result confirms lack of uniformity in the regulatory impact across all firms in the Indian market.

4. Robustness test

Our final analysis aims to investigate the efficacy of regulatory intervention. The main challenge of evaluating impact of regulatory intervention is the construction of counterfactual outcome. It is not possible to know what would happen to insider trading if regulatory intervention did not occur. One of most widely used non-experimental statistical method for evaluation any intervention is Propensity Score Matching Method (PSM).¹¹ PSM uses information from a pool of

¹¹Heckman, Ichimura and Todd (1998), Lechner (1999), Dehejia and Wahba (2002), and Smith Todd (2005) use PSM techniques to estimate the impact of labor market and training programs on income; Jalan and Ravallion (2003) evaluate antipoverty workfare programs; Galiani, Gertler and Schargrodsky (2005) study the effect of water

units that do not participate in the intervention period to identify what would have happened to participating units in the absence of the intervention. By comparing how outcomes differ for participants relative to observationally similar nonparticipants, it is possible to estimate the effects of the intervention. In our case, we consider those firms where insiders have never traded throughout the sample period as the non-participants. The main idea of propensity score matching is to match *ex ante* firm characteristics, x , between insider trades' firms and non-insider trades' firms. In propensity score matching, we match firms by the propensity score p . The probability of insider trades condition on x .

$$p(x) = pr * (D = 1|x) \quad (2)$$

Where D is the event indicator, takes value 1 if a firm belongs to insider trades group; We classify all Indian listed firms into two groups namely insider trading firms and non-insider trading firms. A firm is classified as insider trading firm if the firm has at least one insider trade during 2007-2009, otherwise the firm is classified as non-insider trading firms. The conditional probabilities are calculated from a Logit model. Instead of pooling observations from different years to estimate propensity score model, we run a Logit model for each year from 2007 to 2009. In the Logit regression, we choose independent variables based on existing empirical evidence. They are firm characteristics that have been previously identified to affect the decision of participation in insider trades: the independent variables are Market power, Price to Book Value, Firm size, Debt to equity ratio, Return on Assets, and Amihud illiquidity measure.

Each insider trading firm is matched with a non-insider trading firm based on the closest propensity score. We follow Parsons (2000) methodology for finding the closest propensity score match. Through an iterative process we start matching at 8 digits SIC industry code level and continue the process until a closest match is found up to 1 digit level. The matched sample based mean firm specific characteristics are presented in Table 9. As per the table, all firm characteristics of control group (non-insider trading group) and the treatment group (insider trading group), at the mean level, are significantly not different from each other. This indicates that our matched control group sample is a good representation for evaluating the impact of regulatory intervention.

supply on child mortality; Trujillo, Portillo and Vernon (2005) analyse the impact of health insurance on medical-care participation Almus and Czarnitzki (2003) and Moser (2005) evaluate the impact of research and development subsidies and patent laws on innovation; Lavy (2002) estimates the effect of teachers' performance incentives on pupil achievement; and Persson, Tabellini and Trebbi (2003) analyze the impact of electoral reform on corruption.

Our main test is to see whether the increase in the information content due to regulatory intervention in the treatment group is attributable to the regulation. We hypothesize that our control group do not have any abnormal returns during the insider trading days of the treatment group and there is no significant change in the information content of control group between the two regimes. CARs for (0, 5) window of both control group and treatment group are reported in Table 10. The results in Table 10 show that control group CARs for the insider trading days of the treatment group are not significant in both regimes. Also, there has been a significant increase in the CAR of the treatment group after the regulatory intervention. This result confirms that the increase in the information content is not random and can be attributed to the regulatory intervention.

VI Conclusion

We investigate whether regulatory intervention to improve transparency associated with insider trading is effective in emerging markets that are bogged down by market imperfections. Emerging markets have several institutional voids (Khanna and Palepu, 2000) that create barriers for better information production. This challenging environment makes regulatory intervention weak (Fernandes and Ferreira, 2008). However, there are not many studies that identify the impact of such structural barriers on information production. We use regulatory intervention aimed at restricting short term profiteering behaviour of insiders in the Indian market as a natural experiment to address this issue. In the year 2008, Indian stock market regulator, SEBI, introduced insider trading rules relating to the definition of insider, trading restrictions and timeliness of reporting insider trades. The objective of regulatory intervention is to align insiders interests with the long terms objectives of the firm. Through this regulation the regulator also tries to improve the transparency related to the intent of insider trade for better information production during insider trading events.

Using 9383 insider trades that occurred between years 2007 to 2009 we report the following main findings of our study. We first show that, during pre-regulatory intervention regime, insider trading for short-swing profits was rampant. A typical insider Firm officer trading would generate around Indian rupees Rs.4 more than a random ordinary investor trade during the same period. This evidence supports the rationale for extending the restrictions on potential short-swing profits by insiders. We find that, insider trading significantly reduces in the post-regulation period.

Information production due to insider trades, on average, improves in the post-regulation period. We confirm the effectiveness of regulatory intervention through propensity score matching method. However, the main gains of information production are reported in insider purchases than insider sales. The information content of insider sales significantly reduces in the post-regulation period. This indicates that insider sales do not convey information due to restrictions on the round trip transactions in the post-regulation period.

Finally, we find that the effect of regulation is not uniform across firms. Regulatory intervention is mainly felt among standalone firms. We find that firm level and market level imperfections insulate the impact of from regulatory intervention. Our results highlight the importance of investments for strengthening the environment for more desirable results of regulatory intervention. Future research should focus on the relationship between specific regulatory investments and the corresponding effectiveness of regulatory intervention.

Appendix: Variable Definitions

Variable Name	Definition
Trade Size	The mean of the number of share bought or sold by insiders divided by total share outstanding
Firm Value	The mean of the number of share bought or sold by insiders multiplied by the closing price on the day of announcement
Percentage Trade Size	Ratio of The total share bought or sold by firm officers to total share bought or sold by insiders
Amihud Illiquidity ratio	Amihud illiquidity ratio of a stock absolute return to its dollar trading volume is a day. After then, we average over all day in a year, and scaled
Market Power	We proxy market power by excess price-cost margin as firm PCM (profit after cost of goods sold and admiration and selling expense) over total sales subtracts a PCM of its industry. The industry PCM is a weighted average PCM across firms in the industry, where the weights are based on firm sales/industry sales. For industry classification, we follow CMIE industry classification. The high value of excess PCM indicates more marker power. Our sample includes all BSE and NSE listed firms. We also remove all regulated industries- Financial, Utility, Telecommunication, and Energy.
Price to Book(PB) ratio	The ratio of market price of book value at the end of previous year
Firm Size	log of firm total assets each year
Return on Assets	Profit Before Dividend Interest and Taxes divided by Total Assets.

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Table 1: Short-swing Trading Profits

Pre-Regulation Period		Post-regulation Period				
Variable name	Mean	Number of Observations		Mean	Number of Observations	
		Price Difference (in Rs.)			Price Difference (Rs.)	
Firm Officer Trades	6.46	170		1.79	106	
Large Shareholders	3.51	77		-1.23	146	
Random Holding Period	2.63	10514		-18.11	9,524	

The table presents the average price differences between buy and sell prices. Firm Officer Trades (Large Shareholders) represents round trip transactions undertaken by Firm Officers (Larger Shareholders) within one month (for pre-regulation window) and six months (post-regulation window) periods. Random holding periods represent hypothetical price differences based on several randomly generated trading windows for each firm and for the same trading windows as that of Firm Officers and Large Shareholders.

Table 2: Determinants of Short-swing Profits

Variable name	Coefficient	t-value	Coefficient	t-value
Pre-regulation Period			post-regulation period	
Intercept	-3.85	4.57***	-3.51	2.92***
Firm Officer Trades	0.65	3.77***	-0.36	0.92
Business Group Dummy	0.11	0.11	-0.23	0.34
PB Ratio	0.03	1.67	0.03	0.70
Firm Size	0.39	2.82**	-0.03	0.49
Amihud Illiquidity Ratio	-0.07	1.15	-3.85	4.57***
Return On Assets	1.93	0.20	13.83	3.72***
Low Product Market Competition Dummy	-1.95	0.21	-13.18	3.38***
N	247		228	

This table presents regression results aimed to understand the probability of profitable Firm Officers' trades. The depended variables is the price difference between the buy and sell transactions of Firm Officers, Large Shareholders and Randomly generated trading windows. The trading window for pre-regulation (post-regulation) period results is one (six) month/s. Firm Officer Dummy takes value 1 if the trade belongs to firm officer else 0. Business group dummy takes value 1 for firms affiliated to Indian business groups (as per the CMIE database definition) else 0. Low Product Market Competition Dummy takes value 1 if the firm is part of the bottom 33% of the sample product competition measure as described in the Appendix. Price to Book ratio represents ratio of market price to book value of the firm at the end of the year. Firm Size is measured as total assets at the beginning of the year. Amihud Illiquidity Ratio is measured as ratio of a stock absolute return to its dollar trading volume is a day. Return on Assets represents ratio of Profit Before Depreciation, Interest and Taxes to Total Assets of the firm.

Table 3. Distribution of Insider Trades

<i>Panel A: Firm Size</i>				
	Small	Medium	Large	Total
Number of Insider Purchases	1371	2679	2013	6063
Number of Insider Sales	293	1018	2009	3320
<i>Panel B: Price to Book Ratio</i>				
	Low	Medium	High	Total
Number of Insider Purchases	1472	2615	1976	6063
Number of Insider Sales	265	644	2411	3320
<i>Panel C: Trader Type</i>				
	Purchases	Sales	Total	
Firm Officers	4633	2221	6854	
Large Shareholders	1430	1099	2529	
<i>Panel D: Firm Type</i>				
	Purchases	Sales	Total	
Business Group Firms	2937	1874	4811	
Standalone Firms	3126	1446	4572	
<i>Panel E: Competition Type</i>				
	Low	Medium	High	Total
Insider Purchases	799	2538	2726	6063
Insider Sales	314	1683	1323	3320

The table reports distribution of a number of insider buys and sales, and a number of firms, grouped by firm size (market capitalization), Price to Book ratio. In panel A, we present total number of insider buy and sell into three firm sizes (market capitalization). In panel B, we group all insider buy and sell by price to book ratio. In panel C, we show the frequency of trading of shareholder and firm offices. In panel D, we present insider trades based on business group and standalone firms. In panel E, insider trading on the basis of Market power; Market power is measured as the excess of price-cost margin (PCM). The PCM is defined as operating profit over sales. The excess PCM is constructed as the difference between the firm's PCM and Industry's PCM. The industry PCM is value weighted average PCM across in the industry where the weights are considered as the firm sales/industry sales. For the industry classification, we follow the industry classification of CMIE prowess. To define low, medium and high group on the basis of market power, every year we sort all NSE and BSE listed firms by Market Power and the top 33% firms are in low market power group and the bottom 33% in high market power group and remaining in medium market power group.

Table 4: Descriptive Statistics of Insider Trading Firms

Variables	Before	After	p-value	Before	After	p-value	Before (N)	After (N)
Purchases Trade Size (%)	0.51	0.20	0.001	0.06	0.03	0.001	1264	4799
Sales Trade Size (%)	1.13	0.63	0.001	0.13	0.01	0.001	1011	2309
Purchases Trade Value (in 10 million Rs.)	1.54	0.55	0.001	2.52	0.007	0.001	1264	4799
Sales Trade Value (in 10 million Rs.)	1.66	0.93	0.001	0.05	0.01	0.001	1011	2309
Amihud Illiquidity Ratio	0.62	0.90	0.001	0.017	0.049	0.001	3650	3372
Market Power	0.19	0.51	0.001	0.01	0.01	0.25	3650	3372
Price to Book Ratio	5.4	2.3	0.001	3.11	1.11	0.001	3650	3372
Firm Size	6.43	6.61	0.001	6.59	6.74	0.001	3650	3372
Return on Assets	0.14	0.14	0.135	0.14	0.14	0.125	3650	3372

This table presents distribution of trading and firm characteristics of the sample firms. The definition of market power is provided in Appendix. Price to Book ratio represents ratio of market price to book value of the firm at the end of the year. Firm Size is measured as total assets at the beginning of the year. Amihud Illiquidity Ratio is measured as ratio of a stock absolute return to its dollar trading volume in a day. Return on Assets represents ratio of Profit Before Depreciation, Interest and Taxes to Total Assets of the firm.

Table 5: Information Content of Insider Purchases

Panel A: Overall Announcement Effects						
	Before		After		Difference	
<i>Day 0 (%)</i>	0.48*		0.51*			0.02
<i>Day 1 (%)</i>	0.52*		0.26*			-0.26*
<i>Day 2 (%)</i>	0.19		0.35*			0.16
<i>CAR (-0,+5)(%)</i>	1.36*		2.09*			0.73*
Panel B: Firm Officers Vs Large Shareholders						
	Before			After		
	FO	LS	Difference	FO	LS	Difference
<i>Day 0 (%)</i>	0.30*	0.85*	-0.55*	0.50*	0.53*	-0.03
<i>Day 1 (%)</i>	0.59*	0.36	0.23*	0.35*	0.06	0.28
<i>Day 2 (%)</i>	0.40*	-0.24	0.63*	0.43*	0.17*	0.26*
<i>CAR (-0,+5)(%)</i>	1.78*	0.45	1.33*	2.49*	1.07*	1.42*
Panel C: Standalone Firms Vs Business Group Firms						
	Before			After		
	SA	BG	Difference	SA	BG	Difference
<i>Day 0 (%)</i>	0.74*	0.31	0.43*	0.62*	0.32*	0.29*
<i>Day 1 (%)</i>	0.42*	0.60*	-0.17	0.38*	0.13	0.25*
<i>Day 2 (%)</i>	0.23	0.20	0.03	0.40*	0.31	0.09
<i>CAR (-0,+5)(%)</i>	2.08*	0.87*	1.21*	2.36*	1.70*	0.66*
Panel D: Low Vs High Product Market Power						
	Before			After		
	Low	High	Difference	Low	High	Difference
<i>Day 0 (%)</i>	1.17*	0.36*	0.82*	0.86*	0.37*	0.48*
<i>Day 1 (%)</i>	1.16*	0.41*	0.75*	0.46*	0.27	0.19*
<i>Day 2 (%)</i>	0.50*	0.03	0.48*	0.68*	0.49*	0.20
<i>CAR (-0,+5)(%)</i>	2.61*	1.05*	1.56*	3.86*	2.08*	1.78*

This table shows the abnormal stock returns around the announcement day of insider purchases, separately for buy trades executed before (2007) and after (2008) the regulation. Abnormal returns are obtained using Fama-French 4-factor model. The sample includes all open market purchases of insiders. We also present the abnormal return around the announcement day based on Firm offices vs. Shareholders (Panel B), Standalone vs. Business Group Firms (Panel C), and Market Power (Panel D). * indicate significant level at 5%.

Table 6: Information Content of Insider Sales

Panel A: Overall Announcement Effects						
	Before		After		Difference	
<i>Day 0 (%)</i>	0.10		0.04		-0.06	
<i>Day 1 (%)</i>	-0.10*		0.02*		0.12	
<i>Day 2 (%)</i>	-0.39*		0.14		0.53*	
<i>CAR (-0,+5)(%)</i>	1.09*		0.17		1.25*	
Panel B: Firm Officers Vs Large Shareholders						
	Before			After		
	FO	LS	Difference	FO	LS	Difference
<i>Day 0 (%)</i>	-0.04	0.25	-0.29*	-0.16	0.39*	-0.55*
<i>Day 1 (%)</i>	-0.29*	-0.10	-0.39*	0.13	-0.28*	-0.41*
<i>Day 2 (%)</i>	-0.53*	-0.25	-0.28*	0.08	-0.25	-0.17
<i>CAR (-0,+5)(%)</i>	-1.67*	-0.43	-1.24*	-0.35	-1.09*	-1.44*
Panel C: Standalone Firms Vs Business Group Firms						
	Before			After		
	SA	BG	Difference	SA	BG	Difference
<i>Day 0 (%)</i>	0.00	0.16	-0.16	0.14	-0.09	0.23
<i>Day 1 (%)</i>	-0.18	-0.11	0.07	0.03	0.02	0.01
<i>Day 2 (%)</i>	-0.41*	-0.38*	-0.02	0.18	0.12	0.06
<i>CAR (-0,+5)(%)</i>	-1.23*	-1.24*	0.01	0.10	0.27	-0.18
Panel D: Low Vs High Product Market Power						
	Before			After		
	Low	High	Difference	Low	High	Difference
<i>Day 0 (%)</i>	-0.16	-0.00	-0.16	0.61	0.00	0.61
<i>Day 1 (%)</i>	-0.13	-0.22	0.09	0.54	0.08	0.47
<i>Day 2 (%)</i>	0.23	-0.51*	0.73*	1.22	0.14	1.08*
<i>CAR (-0,+5)(%)</i>	-0.19	-2.00*	2.19*	2.31	0.00	2.31

This table shows the abnormal stock returns around the announcement day of insider sales, separately for sell trades executed before (2007) and after (2008) the regulation. Abnormal returns are obtained using Fama-French 4-factor model. The sample includes all open market sales of insiders. We also present the abnormal return around the announcement day based on Firm offices vs. Shareholders (Panel B), Standalone vs. Business Group Firms (Panel C), and Market Power (Panel D). * indicate significant level at 5%.

Table 7: Determinants of the Information Content of Insider Trading

Variable name	Insider Purchases		Insider Sales	
	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)
Intercept	0.003 (0.67)	0.67** (2.21)	-0.012** (-2.1)	0.051** (2.27)
Firm Characteristics				
PB Ratio		-0.001* (-4.3)		-0.001 (-1.47)
Firm Size		-0.003 (-1.55)		-0.01* (-3.06)
Amihud Illiquidity Ratio		0.001 (-0.19)		-0.003** (-2.36)
Return On Assets		-0.005 (-0.19)		-0.011 (-0.37)
Explanatory Variables				
Regulation Dummy	0.01** (2.53)	0.002 (0.26)	0.013** (2.32)	0.019** (2.01)
FO Dummy	0.01 (3.03***)	-0.006 (-0.74)	-0.013** (-2.61)	-0.003 (-0.3)
BG Dummy	-0.007 (1.74*)	0.009 (1.15)	0.003 (0.68)	0.1 (0.98)
LPMP Dummy	0.009 (1.94*)	0.022** (1.98*)	-0.007 (-0.84)	-0.018 (-1.01)
FO X Regulation		0.02** (2.26)		-0.006 (-0.55)
BG X Regulation		-0.009 (-1.01)		-0.001 (-0.05)
LPMP X Regulation		-0.18 (-1.44)		0.1 (0.05)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-square	0.7%	1.5%	0.6%	1.5%
N	4250	3751	2251	1857

This table presents regression results aimed to understand the determinants of information content released due to the announcement of insider trading. The dependent variable is CAR (0 to +5) of each announcement. Abnormal return is obtained by using Fama-French four factor model. Independent variables are divided into two panels. The first panel presents control variables relating to firm characteristics. Price to Book ratio represents ratio of market price to book value of the firm at the end of the year. Firm Size is measured as total assets at the beginning of the year. Amihud Illiquidity Ratio is measured as ratio of a stock absolute return to its dollar trading volume in a day. Return on Assets represents ratio of Profit Before Depreciation, Interest and Taxes to Total Assets of the firm. The second panel contains explanatory variables based on our hypotheses. Regulatory Dummy takes value 1(0) for insider trades than happened during year 2007 (2009). Low Product Market Competition Dummy (LPMP) takes value 1 if the firm is part of the bottom 33% of the sample product competition measure as described in the Appendix. FO Dummy takes value 1 if the trade belongs to firm officer else 0. BG Dummy takes value 1 if the firm belongs to Indian business group affiliated firm else 0. *, ** indicate significant level at 5% and 1% respectively.

Table 8: Determinants of the Information Content of Insider Trading: Sub-sample Analysis

Variable name	Standalone Firms Firms Coefficient (t-value)	Business Group Firms Firms Coefficient (t-value)	High Market Power Firms Power Firms Coefficient (t-value)	Low Market Power Firms Power Firms Coefficient (t-value)
Intercept	0.008 (0.39)	0.067* (3.39)	0.10* (2.56)	0.056* (2.67)
Firm Characteristics				
PB Ratio	-0.001* (-3.19)	-0.001* (-3.19)	-0.001 (-1.13)	-0.001* (-2.65)
Firm Size	0.002 (0.69)	-0.007 (-3.06)	-0.01* (-2.06)	-0.005** (-1.87)
Amihud Illiquidity Ratio	-0.002** (-1.82)	0.001 (-0.09)	0.001 (0.42)	-0.001 (-1.42)
Return On Assets	-0.066** (-1.76)	0.028 (0.65)	-0.013 (-0.15)	-0.101* (-2.72)
Explanatory Variables				
Regulation Dummy	-0.006 (-0.45)	-0.009 (-0.95)	-0.025 (-0.73)	-0.005 (-0.39)
FO Dummy	-0.003 (-0.23)	-0.004 (-0.35)	0.001 (0.04)	0.008 (0.640)
BG Dummy	NA	NA	0.009 (0.38)	0.004 (0.30)
LPMP Dummy	0.03** (1.69)	0.018 (1.01)	NA	NA
FO X Regulation	0.023** (1.790)	0.009 (0.78)	0.015 (0.45)	0.005 (0.390)
BG X Regulation			-0.004 (-0.003)	-0.16 (-0.20)
LPMP X Regulation	-0.029 (-1.4)	-0.01 (-0.53)		
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-square	2.70%	1.3%	3.6%	1.8%
N	1537	1541	332	1453

This table presents regression results aimed to understand the determinants of information content released due to the announcement of insider trading. This table divides the total sample into several subgroups for understanding the impact of regulatory intervention at sub-group level. The dependent variable is CAR (0 to +5) of each announcement. Abnormal return is obtained by using Fama-French four factor model. Independent variables are divided into two panels. The first panel presents control variables relating to firm characteristics. Price to Book ratio represents ratio of market price to book value of the firm at the end of the year. Firm Size is measured as total assets at the beginning of the year. Amihud Illiquidity Ratio is measured as ratio of a stock absolute return to its dollar trading volume is a day. Return on Assets represents ratio of Profit Before Depreciation, Interest and Taxes to Total Assets of the firm. The second panel contains explanatory variables based on our hypotheses. Regulatory Dummy takes value 1(0) for insider trades than happened during year 2007 (2009). Low Product Market Competition Dummy (LPMP) takes value 1 if the firm is part of the bottom 33% of the sample product competition measure as described in the Appendix. FO Dummy takes value 1 if the trade belongs to firm officer else 0. BG Dummy takes value 1 if the firm belongs to Indian business group affiliated firm else 0. *, ** indicate significant level at 5% and 1% respectively.

Table 9: Matching Sample Comparison Analysis

Variable name	Control Group	Treatment Group	p-value
Market Power	0.09	0.11	0.18
Firm Size	6.13	6.11	0.48
Leverage	0.29	0.28	0.1
Return on Assets	0.0008	0.0009	0.35
Price to Book Ratio	0.59	0.61	0.67
Estimated Probability	0.43	0.43	0.32

This table presents results that compare firm characteristics of control group and treatment group. Our treatment group is insider trades group and the control group is based propensity score matching method. For each insider trades' firm is matched with a non-insider trades' firm based on the closest propensity score. For finding the closest propensity score match, we follow Parsons's methodology ; first we match the propensity score until 8 digits. It then removes all firms those find a match along with the matched firms. Again, we match propensity score until 7 digits and removes the matched firms and insider trades' firm. We iterate these steps until 1 digit match. Market power is measured as shown in the Appendix. Price to Book ratio represents ratio of market price to book value of the firm at the end of the year. Firm Size is measured as total assets at the beginning of the year. Amihud Illiquidity Ratio is measured as ratio of a stock absolute return to its dollar trading volume is a day. Return on Assets represents ratio of Profit Before Depreciation, Interest and Taxes to Total Assets of the firm.

Table 10: Information Content of Insider Trades: Control Group Vs Treatment Group

	Pre-regulation Period	post-regulation period
	Insider Purchases	
Treatment Group	1.00%**	1.41%*
Control Group	-0.65%	-0.06%
Mean Difference	1.65%*	1.47%*
	Insider Purchases	
Treatment Group	-1.56%*	-0.30%
Control Group	-0.74%	0.09%
Mean Difference	-0.82%	-0.39%

This table shows the abnormal stock returns around the announcement day of insider purchases for both control and treatment groups. Our treatment group is insider trades group and the control group is based propensity score matching method. Abnormal returns are obtained using Fama-French 4-factor model. The sample includes all open market purchases of insiders. We also present the abnormal return around the announcement day based on Firm offices vs. Shareholders (Panel B), Standalone vs. Business Group Firms (Panel C), and Market Power (Panel D). * indicate significant level at 5%.