Does Insider Trading Impact Innovation?

Evidence from Insider Trading Restrictions and Enforcement

D. Brian Blank [a], Jiawei Chen [a], and Valeriya Poslynaya [b]

[a] Mississippi State University
[b] University of Minnesota Duluth

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Abstract

In accordance with insider trading law, U. S. Securities and Exchange Commission enforcement actions are intended to limit insider benefits at the expense of outsiders. Enforcement can also act as restrictions to the incentives of firm and employee decisions, which relate to firm value. As a result, we explore innovation and corporate outcomes following insider trading restrictions imposed by both regulators and firms. Using a manually assembled database of insider trading indictments against corporate insiders, we observe that innovative activities positively respond to changes in insider trading restrictions. Further, using firm insider trading patterns to observe the role of firm blackout periods and internal corporate governance restrictions offers similar observations, in addition to links with investment, capital access and performance. Finally, we use rule changes affecting enforcement and indictments for identification and inferences. Overall, these results suggest insider trading restrictions and enforcement actions have important consequences for managerial decision-making.

Keywords: Insider trading restrictions; Innovative patents; Information asymmetry; Governance

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I. Introduction

Information asymmetry can shift the profitability from outsiders to inside trading (Aboody and Lev, 2000). As a result, legal systems are often used to protect minority shareholders in financial markets by limiting insider trading by employees with material, nonpublic information (Djankov, 2008). Additionally, Brown and Martinsson (2017) show that stronger creditor rights and property protections promote investment in high-tech research and development and innovative activities. Due to the long innovation process, information asymmetry and insider incentives are of the most importance at innovative firms (Bushman and Smith, 2001; Healy and Palepu, 2001; Biddle and Hillary, 2006; McNicholas and Stubben, 2008; Biddle, Hillary, and Verdi, 2009).

Information asymmetry can shift the profitability from outsiders to inside trading especially when the impact to firm value is large. Innovation impacts economic growth and firm value (Schumpeter, 1942; Bostan, 2016; Aboody and Lev, 2000), such that inisder trading may be profitable during the innovation process (Bostan, 2016). As a result, restricting insider trading may limit innovation incentives. Alternatively, restricting insider trading could align employee incentives to innovate with those of outside shareholders by limiting agency costs. Therefore, insider trading restriction could result in additional innovative activities and firm value. In an effort to distinguish between these two possibilities, we examine patent activity, innovation and investment with restrictions to insider trading.

Specifically, we focus on two types of insider trading restrictions: enforcement actions by the U.S. Securities and Exchange Commission (SEC), as well as firm governance and blackout periods restricting trading. We observe that innovative and investment are higher when insider trading is restricted, resulting in higher performance. Our results are consistent with insider trading restrictions resulting in higher investments, innovation and firm performance.

Two competing hypotheses could shape the relation between insider trading restriction and innovation: Investor Protection Hypothesis and Insider Profit Hypothesis. First, from the perspective of restricting insiders to protect outsiders, the Investor Protection Hypothesis states that insider trading restrictions may limit insiders' ability to benefit from outside investment in firm. With more outside capital, firm can invest more in innovative activities. Alternatively, from the perspective of the restricted insiders, the Profit Incentive Hypothesis states that insider trading could also motivate insiders to innovate, so they can profit through insider trades.

In terms of the Investor Protection Hypothesis, some scholars suggest insider trading restrictions enhance investment in innovation by providing incentives to investors on valuing innovation. An indictment on insider trading could have a positive impact on innovation through the protection of insiders, attracting additional capital investment. Additionally, insider trading indictments could also boost market liquidity by improving market efficiency. For example, Bhattacharya and Daouk (2002) find that the cost of equity significantly decreases after first prosecution of insider trading laws in a country, which help firm with fund raising. Alternatively, the Profit Incentive Hypothesis suggests that insider trading can also be beneficial and provided as the second-best option to compensate insiders (Bushman, 2005). By providing this compensation, insiders would have more managerial incentives on devoting into profit-maximizing long-run investments instead of pursuing short term performances (Shleifer and Summers, 1988; Bushman, 2005).

In our paper, we examine an element of external governance (i.e., SEC enforcement actions) and internal governance on insider trading (i.e., corporate blackout periods). We use two primary data samples in our paper including hand-collected insider trading restriction data from SEC Litigation Releases and Complaints, as well as the innovation data from The National Bureau of

Economic Research and Noah Stoffman. We obtain the information on the year when a firm gets indicted for illegal insider trading transactions. In terms of measuring innovation, we use several variables including the number of patents which measure the intensity of patenting activities and the number of citations, which measure the importance of the patents.

Consistent with emphasize on the importance of regulation on innovation, we find that both external governance and internal governance on insider trading have a positive impact on innovation after controlling on the firm's characteristics and executive compensation. We perform a difference-in-difference analyses, in which we split our sample group into Indicted firms and Non-indicted firms. We then match the indicted firms to non-indicted firms by firm size and industry. In these analyses, we regress the innovation proxies on the external insider trading restriction that equals one after the firm's first indictment and zero otherwise and on the internal insider trading restriction measured by both *internal restrict* and *internal percent* following Roulstone (2003). We find that the number of patents and citations increase following the initial indictment on insider trading. These findings support the investor protection hypothesis, suggesting restrictive insider trading are linked to more innovation and investment.

First, we show that after initial indictment of insider trading on those firms which have insiders illegally trading corporate inside information, there is an increase in innovation activities. Besides, we also find that investments play important roles in innovation activity. Next, we find that insider trading regulation has a positive effect on firms' confidence in investments in research and development, acquisitions and capital expenditures. This implies that restriction on insider trading has a positive impact on firms' investment. Our findings support the Investor Protection Hypothesis, concluding that after initial insider trading indictment, there is an increase in innovation activity by mitigating asymmetric information and improving investment confidence.

We also conduct several tests in an effort to identify causal inference and concerns regarding reverse casualty. Firstly, we use other changes in the insider trading restrictions as the other accounting rule changes affecting to insider trading enforcement instead of using SEC insider trading restriction. By using other shocks on insider trading regulation, we can alleviate the concerns on the reverse causality. Secondly, we use propensity score which is constructed by the control variables to reshape the size of the data sample, in which we can reduce the bias due to confounding variables in estimating. The results persist, and conclusions hold. Overall, the findings suggest insider trading restrictions and law enforcement actions have positive impact on encouraging investment, incentivizing insiders on managerial decision-making, resulting in an increase in innovation activities.

This paper contributes to the literatures on innovation and insider trading in multiple manners. We contribute by providing supporting evidence through a different view on showing relation between firm level insider trading restriction and innovation. The firm level insider trading regulation also affects the incentives to innovate (e.g., Levine, Lin and Wei, 2015, Bostan, 2016, Hussinger, Keusch and Moers, 2018). Specifically, while Levine, Lin and Wei (2015) focus on the relationship between enforcement of insider trading laws and innovation in international base, this paper focuses more on the relationship between insider trading governance regulation within the firms and innovation. The study here controls for insider's pay-performance sensitivities (exploitation) and firm characteristics and shows that there is a positive relationship between insider trading regulation and innovation (exploration). Bostan (2016) shows that insider returns are significantly larger prior to patent applications. He also observes a positive (negative) relation between the quality of innovation and insider purchases (sales). We find that insider trading restriction has a positive impact on firm performance. We also find evidence that insider trading

restriction improves the firm's confidence in investments and reduces the risk aversion. This implies managers may have added incentive to actively make risky investments, including research & development, leading to an increase in innovation. This paper is organized as follows. Section II describes U.S. insider trading law and reviews the related literature, while section III describes the data and summary statistics. Section IV shows our empirical approaches and results. Sections V presents robustness tests before the final section VI concludes.

II. Background and Related Literature

US insider trading law is enacted by the U.S. Congress after the stock market crash of 1929. U.S. Securities and Exchange Commission (SEC) are making the details for the insider trading law, enforcing the insider trading law and monitoring companies. According to SEC, "insider trading" includes both legal and illegal conduct. On the one side, Legal insider trading is when corporate insiders including officers, directors, and employees buy and sell stock in their own companies without using unpublic available data. When corporate insiders trade in their own securities, they must report their trades to the SEC within a small window period of earning report date. On the other side, SEC states that "illegal insider trading refers to buying or selling a security, in breach of a fiduciary duty or other relationship of trust and confidence, while in possession of material, nonpublic information about the security". In conclusion, insider trading is treated as illegal ones when there is involved with trading on unpublic available information of the company's securities.

To resolve two insider trading issues where the courts have disagreed, the SEC adopted new Rules 10b5-1 and 10b5-2. According to SEC, Rule 10b5-1 provides that "a person trades on the basis of material nonpublic information if a trader is "aware" of the material nonpublic information when making the purchase or sales". The rule permits persons to trade within certain

specified circumstances where they are clearly aware of information, which is not a factor in the decision to trade. Rule 10(b) 5-2 clarifies "how the misappropriation theory applies to certain non-business relationships". This rule provides that a person would owe a duty of trust or confidence when receiving confidential information under circumstances specified in the rule 10(b) 5-1 , resulting in that they could be liable under the misappropriation theory.

A. Literature on Insider Trading Laws

Arturo Bris (2005) explores the effectiveness of insider trading laws in a global context. He found that insider trading laws enforcement increases insider profits and reduces illegal insider trading. He also found that there is a negative relation between toughness of the law and insider trading profits. There are two sides of effectiveness of insider trading laws in a global context. For scholars that are arguing insider trading laws are required, it reduces agency costs and opportunistic managerial behavior. Insider trading laws also reduce information asymmetry and thus improve liquidity (Copeland and Galai, 1983; Leland, 1992). Insider trading laws enhance market confidence (Ausubel, 1990). This is consistent with the findings in our results that shows restriction on insider trading has increase firm's confidence in investment. On the opposite side, insider trading would increase market efficiency (Manne, 1966; Leland, 1992). It also effectively compensates managers (Dye, 1984).

Moreover, through Beny's findings (2007) on insider trading laws, she builds upon the idea from Manne (1966) and explains that insider trading is desirable because it is economically efficient. This paper's main focus is built upon Manne's theoretical predictions (1966). Manne (1966) proposed that treat insider trading is an efficient compensation mechanism. He proposed that insider trading is economically efficient because it motivates entrepreneurial innovations. He

also proposed that insider trading allows entrepreneurs to be rewarded directly and contemporaneously with their innovation. We want further to prove his argument by testing whether insider trading law enforcement would have negative impact on firm's innovation. However, our findings contradict to the augments from Manne's theoretical predictions (1966). We find that insider trading regulation has a positive impact on the firm's innovation by mitigating asymmetric information and principal-agent problem.

B. Literature on Innovation and Regulation

Manso (2011) finds that risk tolerance level for early failure and reward for bearing long-term risk are high the optimal innovation-motivating incentive scheme. He explains that excessive threat of termination discourages the agent from shirking or exploration but can promote an optimal contract between principal and agents, which motivates exploitation such as innovation. Following by Manso's arguments on innovation motivation, we set up the test between innovation and regulation, specifically on insider trading regulation, which changes the agent behavior on the projects. As we control on exploitation (pay-performance sensitivities), we find a strong positive relationship between insider trading regulation and exploration (innovation). We also find that insider trading regulation has positive impact on firm's risk tolerance level and increase in the firm's financial performance. These results are consistent with Manso's theory where optimal innovation-motivation, which is promoted by regulation, is driven by bearing high risk.

Ross Levine, Chen Lin, and Lai Wei (2015) firstly explore the relationship between insider trading and innovation based on a cross country study. They focus on a question of whether legal systems that protect outside investors from corporate insiders increase or decrease the rate of technological innovation. They study over 75,000 industry-country-year observations across 94

economies from 1975 to 2006. Whereas, our studies focus only the industries in U.S. with the time period from 1985 to 2005 with controls specifically on firm and insider level. They find that enforcing insider trading laws spurs innovation. Our findings are consistent with their findings in that insider trading laws increase innovation by alleviating asymmetric information through improving incentives to innovate, thus pushing firms to the optimal contract.

III. Data and Sample Construction

There are two main data sources for insider trading law enforcement and patents. For insider trading law enforcement, the data is collected by using U.S. Securities and Exchange Commission (SEC) and WRDS market data fiscal year 1985 to 2005. The law enforcement data is reported annually and contains indicted U.S. companies from 1985 to 2005.

For insider trading argument, Bhattacharya and Daouk (2002) and Roulstone (2003) studied the insider trading law from two perspectives including insider trading law enforcement by using *external restrict* variable and firm-level insider trading regulation by using *internal restrict* variable. The *external restrict* variable generated following by Bhattacharya and Daouk (2002) is focusing on the impact of first prosecution on somebody for violating its insider trading laws at the country level. The *internal restrict* variable is used to indicate the impact of regulation level of insider trading within each firm. For the purpose of this paper, we use *external restrict* variable to study the impact of first indictment on someone for violating insider trading laws. From Roulstone's paper, we derive the *internal_%* variable from the *internal restrict* variable. *External restrict* equals to one after the initial indictment for each firm where someone inside the firm violated insider trading laws in U.S., and otherwise equals zero. We use *internal_%* variable to find the patent of firm year level changes on the insider trading regulations. *Internal_% represents*

the number of insiders trading within a 30-day window of the earnings report date divided by the total number of insider trading during the year. *Internal restrict* equals to one when *Internal_%* is greater than 75%. The difference between using *percent* and *restrict* variable here relies on how you want to analyze the data. *Internal restrict is* a suitable dummy for a country level study, where it doesn't involve the time series data. Because the focus of our paper is on analyzing insider trading regulation which varies by firms and years, we want to have a variable which not only represents the similar meaning of *internal Restrict* variable but also varies by years. Then the *internal_% variable* here fits the best our story.

For patents, data is collected by United States Patents and Trademark Office, Filing Year by Application Serial Number. The main part of data for patent is collected by Noah Stoffman (2016). They hand collected the patent data issued to US firms. They also include the stock market responses to news about patents. Their data is hand collected by searching patents through Googles Patents. There are three main parts in the data for patents*: tcw* is measured by citation-weighted value, *tsm* is the market-value firm innovation measure, and *fNpats* is the number of patents. To avoid truncation basis, our sample excludes the last five years of innovation data (Dass, Nanda and Xiao, 2016). Due to the data limitation of insider trading from Thomson Reuters, our data sample starts from 1985. Therefore, our patents data sample limits down into from 1985 to 2005.

The independent variable *External restrict* indicates initial indictment on insider trading which focuses on civil cases. The independent variable *Internal_% and Internal restrict* captures the firm level insider trading restriction. *Firm Size* is measured as book value of asset. The *Market-to-Book* ratio is calculated as market price per share divided by book value per share. The *ROA/ ROE* ratio is measured as return on assets or return on equity (used to estimate the firm's profitability). *Age* is measured by the number of years left to retirements for executives. Finally,

since firm's compensation package could also be shaping the relationship between innovation and insider trading restriction, we control on *Vega* and *Delta* for pay-for-performance sensitivities analyses. The dependent variable includes patents measurements. *Citation* is measured by citation-weighted value. *Valuation* is the market-value firm innovation measure. *Patents* is the number of patents. In order to do the robustness test on the different measurements, we have three different dependent variables. The patenting activities in table 3 and table 4 is set up for testing the relationship between the toughness of the insider trading law and the incentive for innovation. The table 5 measures the relationship between toughness of the insider trading law and outside investment level. The table 6 measure the relationship between other firm performance and toughness of the insider trading law. Combining three equations would show us how the insider trading law affect the incentives to innovation through the number of patents acquired, the quality and value of patents and market-value firm innovation measure by mitigating principal-agent problem and increasing investors' confidence level and risk taking.

In the difference-in-difference analyses (From table 7 to table 9), our treatment group refers to indicted firms and control group refers to non-indicted firm. Post equals to one after the firm's initial indictment or accounting rules changes and zero otherwise. We then regress patenting activities on the interaction between treatment group and post. The regression also includes firm, industry and year fixed effects. We also control on the firm characteristics and insiders' compensation package. In table 7 and table 8, we construct sample by using matched sample based on size-industry and propensity score-industry. In table 9, we use full sample to tests the impact of the inside trading regulation changes on patenting activities.

We report the summary statistics in different panels on size-industry matched sample: Table 1 panel B (full sample), Table 2 panel A (treatment group: indicted firm), and Table 2 panel

B (control group: non-indicted firm). Specifically, Table 1 panel B shows that there is more innovation including the number of patents and citations for indicted firm compared to the non-indicted firm. Besides that, outstanding shares is also greater for the indicted firm which implies that insider trading restriction increase the capital by protecting the outside investors' interests. Table 2 panel A and panel B shows that there is more patenting activities and investments following initial indictment. Together, our summary statistics results are consistent with our investor protection hypothesis.

IV. Empirical Research and Methodology

In this section, we present results on the relationship between innovation and the toughness of regulation on insider trading law. We first use the baseline regression to predict the effect of initial insider trading indictment on firms' innovation. We then look at how the initial insider trading indictment and firm governance on insider trading can affect firms' investment level. Based on that, we also present results in how initial insider trading indictment can affect the firms' risk aversion level. Last, we test how exactly the firm governance on insider trading regulation affect research and development expenditure.

While the prior researchers were focusing on the relationship between insider trades including purchases and sales and innovation (Bostan, 2016; Hussinger, Keusch and Moers, 2018), this paper focuses on the relationship between insider trading indictment and innovation. In this section, I investigate whether the initial enforcement of insider trading law spurs innovation. To test the hypothesis that Insider trading regulation has an unintended impact on firm's innovation. quality, we reveal the insider trading regulation as a stimulus that increase firm's insider trading opportunities during patent application process. From Table 3, we can see there are positive

significant relationship between regulation indictment variable and patent-based measurement *ceteris paribus*. The results imply that the stricter the regulation is on insider trading; the more patents will be produced in the market.

Furthermore, in order to test whether the decrease of insider trading opportunities would affect corporate's insider's incentives to innovation in insider trading indictment year, we detect innovation by using the number of successful patents (*patents*), the number of forward citations received by these patents (*citations*) and the market value of those patents (*valuations*). The three measurements of innovation including *patents, valuations* and *citations* were generated by the Noah Stoffman (2017). According to insider trading literature, there is a lag impact of insider trading indictment on forwarding year of innovation. To account for the lag impact, we use the forward year patent-based measures and test the relationship between our main variables and those forward year patent-based measures. Since private-held firms are vulnerable to a variety of economic shocks and hard to collect their financial information, we focus on public-listed firms' patenting activity instead of private-held firm.

First, we present summary statistics in Table 1 and Table 2. In Table 1, Panel B shows that indicted firm would experience a higher increase in patenting activities in terms of the number of patents and citations during post enforcement period compared to pre enforcement period. We could also observe that following initial indictment, there is a substantial increase in the number of outsiders' investment, which is measured as shares-outstanding. Furthermore, the leverage ratio also increases during the post-enforcement period. These results imply that after initial indicted, firm would increase on investment which flows from outside investors. Table 2 compares treatment group (Indicted firms) with control group (Non-indicted firms) where indicted firms have higher innovation, investment and leverage. Table 2 also compares the non-indicted firm pre-

and post-enforcement periods where there is no significant difference in the amount of innovation and leverage between the two periods. The results from summary statistics support hypothesis two that insider trading restriction spurs innovation.

Next, to better illustrate the relationship between insider trading regulation and patent activity, we use a firm's characteristic and executive compensation as control variables in predicting how the insider trading regulation would affect on firms' innovation ability. Firm characteristic contains *log (total asset), ROA, leverage, CAPEX, PPE, Market Capitalization), RDAT (Total R&D expense/total asset) and Tobin's Q*. Executive compensation includes *Vega and Delta*.

By using a patent sample from Noah Stoffman (2017), we control for year fixed effects and industry fixed effects and get the data window from 1985 to 2005. For the Compustat and CRSP sample, we also control for year fixed effects, industry fixed effects and firm characteristics including log of total assets, return on assets, and leverage etc. Our dependent variables are the number of successful patents, the number of citations received by those patents (citation-weighted patent counts) and the market value of those patents. Then, we used equation (1) to test our hypothesis.

In Table 3, the results show that firms would have much higher incentives to innovate during the indictment year with control over firms' financial characteristics and insiders' compensation. According to panel A and panel B, there is a strong positive relationship between insider trading regulation and innovation quality measured by *citation and quantity*. In panel A, we use the total weight citations to measure the innovation valuation; and column 1 present that as SEC insider trading restriction goes up, there will be high innovation valuation in terms of citation. Based on panel A, we conclude that there is a positive increase in in total weight citations

after the initial indictment of insider trading. In panel B, we use the total weight number of patents as measurement of innovation incentives where we observe that there is a positive relationship between SEC insider trading restriction and the number of patents. We can further see from both panel that as investment including research and development expense rises, innovation valuation and incentives also increase which is consistent with other literature.

A. The Role of firm-level Governance, Insider Trading, and Investment

In the previous section, we test the hypothesis whether insider trading regulation (industry-level regulation) would affect firm investment level. We find that *invest* variable has a significant impact on the firm innovation. While firm's innovation is affected by industry-level regulation, it is also affected by firm-level regulation. In this section, we provide further evidence that the firm-level insider trading regulation is also one of the factors driving the investment decision which has impact on the firms' innovation.

Prior researchers such as Roulstone (2003) who agree with second best optimal contract finds that board intentionally provide expected insider trading profits in designing executive compensation contracts. In Roulstone's paper, he uses *Restrict* which is a dummy variable for 1 if 75 percent of insider trading is within the 30 days of earning reporting period and for 0 otherwise. Following by Roulstone (2003), we use the independent variable *Internal_%* as a proxy to firm-level insider trading regulation for our hypothesis test. *Internal_%* account for the percent of insider trading is within the 30 days of earning reporting period which varies by years. We use *Internal_%* to make a better prediction for different firm-year observation which provides a better overview of how much firm governance on insider trading affect firms' investment decision.

To test our hypothesis on the relationship between firm-level insider trading regulation and patent activity, we also use firm's characteristic as control variables in predicting how the insider trading regulation would affect on firms' innovation ability and investment. On the left-hand side, $outcome_{i,t+1}$ includes innovation measurements and investment measurement. Innovation measurement contains the numbers of patents and citations. Investment measurement contains capital expenditure, research and development expense, and acquisition. On the right-hand side, *Firm characteristic* contains *log (total asset), ROA, leverage, CAPEX, PPE, market capitalization, RDAT (Total R&D expense/total asset), acquisition, and Tobin's Q*. $Restriction_{i,t}$ measures the internal and external insider trading restrictions. $Executive\ Compensation_{i,t}$ include *CEO age, Vega, and Delta*. The estimate model (1) has firm *i* and year *t* with year and industry fixed effect and standard error clustered by industry:

$$Outcome_{i,t+1} = \alpha + \beta\ Firm\ Characteristic_{i,t} + \gamma\ Restriciton_{i,t} + \varphi\ Executive\ Compensation_{i,t} + \varepsilon_{i,t} \quad (1)$$

In Table 3, according to column 3 and 5 from panel A and panel B, there is showing a statistically positively significant relationship between the *internal_%* variable and innovation measurements while holding other controls variables constant. For highly *internal_%* firms, there is higher increase with respect to the investment level. As the increase restriction level of insider trading at firm-level, there would be more incentives for insiders to actively participating in innovation. It is consistent to the previous results where insider trading indictment spurs the innovation activities. Firm level regulation doesn't directly have effects on innovation, whereas industry-level insider trading regulation has direct positive impact on innovation. There are several reasons which could help explaining this result. Firstly, the firm-level insider trading regulation would be much different from how government regulate insider trading in the ways of

enforcements. Secondly, the monitoring system within the firm is more effective and efficient than government auditing firm. With the heteroscedasticity consistency, our result is robust for showing the relationship between the toughness of the insider trading law and the incentive of innovation.

In Table 3, we can see that there is also a positive relationship between the between the value of the patents and toughness of the insider trading law. It means that the productivity and efficiency has been cut down as insider trading law become tougher. The impact of tougher insider trading law is negative to the insiders within the company. With the heteroscedasticity consistency, our result is robust demonstrating a strong relationship between the toughness of the insider trading law and the quality and value of the patents. Furthermore, we also present the analyses in Table 4 particularly on the relationship between external restriction and patenting activities in the size-industry matched sample. The results are also robust.

B. Does Insider Trading Indictment Affect Outsiders Investment Level?

The discussion in previous sections is on testing hypothesis whether insider trading regulation for firm-level and industry level would affect investment level. This section focuses more testing the hypothesis whether risk insider trading restriction can provide protection for outside investor, resulting in more capital investment.

SHR_{t+1}, CEQ_{t+1}, SEQ_{t+1} *and* $CSHI_{t+1}$ are widely used as proxies of the level of investment from outside investors. In this section, we hypothesis that outstanding shares, total equity, and common shares issued would be affected by insider trading regulation. If insider trading regulation provide protection for outside investor, there would be an increase in outstanding share, total equity, and common shares following the restriction. Furthermore, these outsider investments play

an important role in deciding the firm investment structure, which is affect by insider trading restriction, impacting patenting activities.

To test our hypothesis on the relationship between outside investment and insider trading regulation, we also use firm's characteristic as control variables in predicting how the insider trading regulation would impact on firm's investment confidence level. The Dependent variable is SHR_{t+1}, CEQ_{t+1}, SEQ_{t+1} *and* $CSHI_{t+1}$. SHR_{t+1} captures the total share existing for the company. CEQ_{t+1} *and* SEQ_{t+1} measures the common shareholder' interests and the total equity. $CSHI_{t+1}$ captures the common share issued. The independent variable is divided into is *indictment* (*external restrict*). The control variables firm characteristic contains *log (total asset), ROA, leverage, CAPEX, PPE, Market Capitalization and Tobin's Q*. The estimate model has firm, year, and industry fixed effect and standard error clustered by industry.

In Table 5, the results are significant on those control variables of firm characteristics, year fixed effects, firm fixed effects, and industry fixed effects. On the one hand, insider trading indictment presented a significant increase in $OutstandingShares_{t+1}$, *Shareholder' interests*$_{t+1}$, *and Common shares issued*$_{t+1}$, following as firm-level insider trading restriction goes up. This result implies that, after initial indictment on insider trading, firm would have more confidence in borrowing more money and make larger investment which is supported by outside investors. The increment in $OutstandingShares_{t+1}$, *Shareholder' interests*$_{t+1}$, *and Common shares issued*$_{t+1}$ shows that firm would attract more outside investment, leading to the increment in investment level, thus supporting increase in innovation. One the other side, the variable *indictment (external restrict)* is significant showing that firm level insider trading has more impact than SEC insider trading indictment on providing protection for outside investor from illegal insider trading. We can therefore conclude that the restriction level on firm level has impact of raising capital from outsider

investment. Additionally, from the summary statistics Table 1 and Table 2, the larger increase on outstanding share, equity, and common shares suggests that the indicted firms have attract more capital relative to non-indicted firms to then invest. Comparing to the previous results from table 6, we then conclude that when firm impose higher restriction on insider trading, firm gain more confidence in making large investment and more risk preferred decisions, leading to increment in innovation incentive and increase in innovation.

C. Investment and Firm Performance

In this section, we then address on whether those firms experience an increase in other dependent variables such as *Investment* including *R&D* expense (research and development expense), *CAPEX* (capital expenditure scaled by total assets), and acquisition; *ROA* (return on assets) and *ROE* (return on equity) after the initial indictment of insider trading. According to the previous section results, our models predict that indictment on insider trading will encourage investors to become more risk tolerant and expend more resource on innovation activities, so indictment will have a positive impact on firm's risk tolerance and investment levels and hence innovation in those firms which experience information asymmetries.

As expected in table 6, we find that *Investment*, *ROA* and *ROE* as alternative measurements for innovation are also affected by insider trading regulation with controlling on firms' characteristics and insider's option pay. For *Investment*, there is a positive increase in investment as *percent* (proxy for insider trading regulation on firm level) increases. For *ROE*, only firm-level insider trading restriction has a positive impact on *ROE*. The results indicate that firms that have higher insider trading regulation would have more incentives and confidence in making investments, thus making firms more profitable (positively related to *ROE*). With controls on *vega*

and delta as proxy for pay-performance sensitivity, we further conclude that insider trading regulation can reduce the disincentives of mangers making investment while bearing high risk. In terms of the role of insider trading restriction in principal-agent framework, we study how the insider trading restriction change the incentives for exploration and exploitation (Manso, 2011). *Vega and delta* serve as a proxy for controlling the effect from insider trading restriction on exploitation, which refers to standard pay-performance. As having control on exploitation, we then show how much restriction on insider trading impacts exploration as measured by innovation. This is consistent with what scholars found in the past, where restriction on insider trading serves as protection for improvements of the efficiency of stock prices which encourage exploration in long-term projects such as innovation (Manso, 2011).

V. Robustness

In this section, we conduct several tests based on different matched sample data and different quasi-natural experiments tests. Under matched sample tests, there are two different tests including industry and size matched sample, and propensity matched sample tests. We check the robustness of the results under these limited samples. Under quasi-natural experiments tests, we test the relationship between innovation valuation and three exogenous shocks including *Sarbanes-Oxley Act of 2003*, *Insider Trading and Securities Fraud Enforcement Act of 1988, and The Securities Enforcement Remedies and Penny Stock Reform Act of 1990*.

A. Matched Sample tests

Regarding to the robustness of our results in previous tests, we use two different ways including industry-size match and propensity score match to construct matched sample data and

re-check our baseline model in Table 7 and Table 8. After match based on industry and size, the sample size reduces from 8,525 firm-year observations to 5,597 firm-year observations when controlling on firm characteristics and CEO compensation package. After match based on propensity score which is built based on control variables in the baseline regression, the sample size reduces from 8,525 firm-year observations to 4,916 firm-year observations when controlling on firm characteristics and CEO compensation package.

In Table 7 industry-size matched sample, we match indicted firms with non-indicted firms by industry and firm size. Each panel in Table 7 provides a separate analysis in terms of firm fixed effect and industry fixed effect. In Panel A, when we control on the industry fixed effect, there is a positive relationship between SEC insider trading restriction, firm-level insider trading restriction and innovation valuation. In Panel B, the previous results still hold under firm fixed effects. The positive relationship between *Investment* (R&D, CAPEX, and Acquisition) and innovation valuation is also consistent with literature where higher firm investment confidence brings more funds in innovation.

In Table 8 propensity matched sample, we match indicted firms with non-indicted firms by propensity score which is the predicted value by regressing on the control variables from baseline model. In both Panel A and Panel B, we can conclude that both SEC insider trading restriction and firm-level insider trading restriction have positive impact on innovation valuation. The results is robust under both firm fixed effects and industry fixed effects.

B. Quasi-natural experiments

The results of the robustness check related to SEC insider trading restriction is presented in Table 8 by using three different exogenous shocks including *Sarbanes- Oxley Act of 2003*,

Insider Trading and Securities Fraud Enforcement Act of 1988, and The Securities Enforcement Remedies and Penny Stock Reform Act of 1990. Since SEC insider trading restriction has potential impacts on both insider trading and innovation activities, there is some problems on endogeneity issues. To solve the potential endogeneity problem, we use exogenous shocks such as enforcement of these regulation. For independent variable, we create a dummy variable which equals to one if the number of total insider trading or the total value of insider trading is above medium during the year.

Each panel in Table 9 provides a separate analysis regarding to different events. In Panel A, we check on how *Sarbanes- Oxley Act of 2003* affects the relationship between indicted firm and innovation valuation. First, in Column 1 and 2, we show that *P(indict-Value) and P(indict-Freq)* during post-SOX period has positive relationship with the likelihood of getting indicted. Furthermore, Column 3 and 4 further presents that there is a positive relationship between *Sox*P(indict-Value)/Sox*P(indict-Freq)* and *citation*. This means that after SOX, indicted firm has higher likelihood of having higher innovation quality measured by *citation*. Column 5 and 6 also presents that there is a positive relationship between *Sox*P(indict-Value)/Sox*P(indict-Freq)* and *patents*. This means that after SOX, indicted firm has higher likelihood of having higher innovation incentives measured by *patents*. Together, indicted firms are more likely to have higher innovation valuation after SOX. On the contrary, Panel B present that there is a reverse relationship between post*treat (*fraud*indict and penny*indict*) and innovation valuation. In conclusion, accounting rules change to insider trading has positive impact on firm patenting activities.

VI. Conclusion

The overall results provide supporting evidence on market efficiency hypothesis that insider trading restrictions have a positive impact on innovation by improving market efficiency. Firstly, the results indicate that there is positive correlation between the toughness of insider trading and rate of technological innovation. We can see that after initial indictment of insider trading, innovation has increased in terms of number of patents acquired, the number of citations received by those patents and the market value of those patents' quality. Specifically, *investment* (contains CAPEX, R&D and Acquisition) plays an important role in explaining the relationship between insider trading regulation and exploration such as innovation. After initial indictment on insider trading, the investment has significant positive impact on innovation, which is driven by the increase on the outsider investment confidence level, which is based on the protecting outside investor from corporate's illegal inside trading.

Secondly, we conclude that firm level restriction on insider trading regulation has a significant impact on the firm's investment level with controlling firms' characteristics. The results also imply that restriction on insider trading alleviates the information asymmetries, which increases the investor's confidence level, leading into an increase in incentive to innovation, thereby an increase in innovation. To better understand why insider trading regulation increases the investor's confidence level, we then present a test between the insider trading regulation and *outside investment including outstanding share, total shareholders' equity and common shares issued*. We find that after initial indictment on insider trading, as the *internal_%* (insider trading restriction on each firm) increases, the average company would experience a higher increase in capital, resulting in more investment in innovation by *investment*. Based on these results, we can then make the conclusion that insider trading regulation has a positive impact on outside investor's

investment level, which increase the capital leading into more patenting activities. For highly restricted firms, there is an increase with respect to the patent measurements: the number of patents acquired each year, the number of citations received by those patents and the market value of those patents. Our result for restriction on insider trading at firm level is contradictory to Manne's theoretical arguments, where we agree with second best optimal contracting theory. But insider trading regulation could help the firm approach an optimal contract by mitigating principal-agent problem. As the firm internal governance on insider trading becomes stricter, there will be more incentives on innovation.

Thirdly, according to the alternative dependent variables, we test our hypothesis on the relationship between other alternative dependent variables such as R&D and CAPEX as proxies for innovation (exploration) and insider trading regulation. Our findings show that there is also a significant positive relationship between alternative variables and insider trading regulation when we are using *internal_%* and *external restrict* variables as proxy of insider trading restriction. We also find that after initial indictment on insider trading, firm's profitability (*ROA and ROE)* has also significantly increased. Additionally, we also construct matched sample and account for the impact of accounting rules changes to innovation. All the results are robust.

In conclusion, we provide supporting evidence on the view that insider trading regulation spurs firm's ability on exploration, specifically on innovation activities by alleviating the principal-agent problem and intensifying the investment confidence level.

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Appendix A - Variable Definition

Dependent Variable	Definition
$Citation_{t+1}$	Citation-weighted value, measure of the output of innovation produced by a firm citation-weighted (cw) patents divided by the book assets of firm f in year t+1.
$Valuation_{t+1}$	Market-value firm innovation measure, total dollar value of innovation produced by a given firm f in year t+1 based on stock market (sm), by simply summing up all the values of patents j that were granted to firm divided by the book assets of firm f in year t.
$Patents_{t+1}$	Number of patents in year t+1
$Leverage_{t+1}$	Firm *i*'s leverage ratio, defined as book value of debt divided by book value of total assets measured at the end of fiscal year t, set to o if missing
$Invest_{t+1}$	Firm *i*'s total investment (= R&D + CAPEX + Acquisition) scaled by total assests at the end of fiscal year t, set to o if missing
$CSHI_{t+1}$	The common shares issued
CEQ_{t+1}	The common shareholders' interest
SEQ_{t+1}	The total shareholder's equity
SHR_{t+1}	The outstanding shares

Independent Variable	Definition
Indict	Dummy variables for indication of indicted firm
Non-indict	Dummy variables for indication of non-indicted firm
External restrict	Firm level created dummy variables for indication of prejudgment
Internal restrict	Equal to one if internal_% is above 75%
Internal_%	Allowed insider trading transaction frequencies divided by insider trading frequencies
P(indict-freq)	Dummy variables equal to one if insider trading volume is above medium before accounting rules changes
P(indict-value)	Dummy variables equal to one if insider trading value is above medium before accounting rules changes

Control Variable	Definition
Cash	Cash holding divided by total assets

Market Cap	Manually figuring the market value of Common Stock
Log (Market Cap)	Log (Market Value of Equity +1)
Log (Total Assets)	Log (Total Assets +1)
Log (Sales)	Log (Sale +1)
Log (Firm Age)	Log (Firm Age +1)
Log (CEO Age)	Log (CEO Age +1)
ROA	Return on asset ratio defined as operating income before depreciation divided by book value of total assets, end of fiscal year t
ROE	Return on equity ratio defined as operating income before depreciation divided by book value of total equity, end of fiscal year t
CAPEX	Capital expenditure to total assets
RDAT	Research and development to total assets
PPE	Property, plant & equipment divided by book value of total assets measured at the end of fiscal year t
Sale	Sales by fiscal year
Tobin's Q	Tobin's q, Firm *i*'s market-to-book ratio during fiscal year t, calculated as market value of equity plus book value of assets minus book value of equity minus balance sheet deferred taxes divided by book value of assets
R&D Expense	Research and development expenditures
Leverage	Firm *i*'s leverage ratio, defined as book value of debt divided by book value of total assets measured at the end of fiscal year t, set to o if missing
Executive compensation	Vega and Delta

Table 1 – Descriptive Statistics

The sample consists of 7,674 firm-years jointly covered in the Compustat, Thomson Reuters, the NBER Patent and Citation Database between 1985 and 2005. *External restrict* is collected from SEC. Patent data including *valuation, citation, and patents* are from NBER and Noah Stoffman. Firm characteristic data including *leverage, ROA, ROE, PPE, market capitalization, Tobin's Q, firm age, volatility, and investment (including: Capex, Acquisition, and R&D expenditure)* is from CRSP and COMPUSTAT. Insider trading data including *Internal_%* is from Thomson Reuter database. Executive compensation data including *Vega and Delta* is from Executive Compensation database.

Panel A: Full Sample

	Count	Mean	P25	Median	P75
Valuation	7,674	645.132	0.000	5.914	84.579
Citation	7,674	72.580	0.000	4.213	28.698
Patents	7,674	30.731	0.000	2.000	13.000
External Restrict	7,674	0.015	0.000	0.000	0.000
Internal %	7,674	0.544	0.423	0.540	0.667
Leverage	7,674	0.203	0.052	0.198	0.313
Log (CEO Age)	7,674	4.033	3.951	4.043	4.127
Vega	7,674	35.000	0.000	6.039	22.352
Delta	7,674	216.061	0.035	18.059	70.006
Log (Total Assets)	7,674	6.998	5.895	6.843	7.941
ROA	7,674	0.035	0.019	0.055	0.092
PPE	7,674	0.284	0.136	0.238	0.385
Market Cap	7,674	7.194	6.063	7.016	8.232
Tobin's Q	7,674	0.494	0.340	0.511	0.640
Investment	7,674	0.143	0.069	0.116	0.185
Log (Firm Age)	7,674	3.035	2.485	3.178	3.664
Volatility	7,674	0.128	0.078	0.108	0.158

Panel B: Innovation and Investment for Indictment and Control Firms

	Non-indicted		Indicted		
	N	Mean	N	Mean	t-test
Patents $_{t+1}$	1,858	90.5	1,729	124.22	2.85***
Citations $_{t+1}$	1,858	182.35	1,729	293.94	4.25***
Patent Value $_{t+1}$	1,858	463.34	1,729	2038.59	8.99***
Invest $_{t+1}$	1,518	0.142	1,522	0.174	4.69***
Leverage$_{t+1}$	1,755	0.229	1,630	0.196	-4.92***
Share-outstanding $_{t+1}$	1,760	158,309.5	1,630	415,393.5	8.373***

Table 2 – Univariate

The sample consists of 1,729 and 1,858 firm-years jointly covered in the Compustat, Thomson Reuters, the NBER Patent and Citation Database between 1985 and 2005. Panel A and Panel B are created based on a size-industry matched sample. Panel A covers indicted firms' sample which refers to treatment group of firms that get indicted by SEC on illegal insider trading and get punished. Panel B covers non-indicted firms but have similar size (within 10% difference) and same industry compared to Panel A firms.

Panel A: Indicted – Innovation and Investment for Treatment Firms Around Enforcement

	Pre-Enforcement		**Post-Enforcement**			
	N	Mean	N	Mean	t-test	Difference
Patents $_{t+1}$	1,126	104.22	603	161.56	2.90***	57.34***
Citations $_{t+1}$	1,126	248.949	603	377.954	2.778***	129.01***
Patent Value $_{t+1}$	1,126	2,178.30	603	1,777.70	-1.097	(400.60)
Invest$_{t+1}$	951	0.168	571	0.185	1.74	0.02
Leverage $_{t+1}$	1,028	0.181	602	0.222	4.00***	0.04***
Sharesoutstanding$_{t+1}$	1,027	319,841	603	578,133.80	4.07***	258,292.80***

Panel B: Non-Indicted – Innovation and Investment for Control Firms

	Pre-Enforcement		**Post-Enforcement**			
	N	Mean	N	Mean	t-test	Difference
Patents $_{t+1}$	1,277	89.217	581	92.982	0.237	3.77
Citations $_{t+1}$	1,277	182.768	581	181.439	-0.041	(1.33)
Patent Value $_{t+1}$	1,277	551.219	581	270.183	-2.732***	(281.04) ***
Invest $_{t+1}$	1,018	0.129	500	0.168	3.709***	0.04 ***
Leverage $_{t+1}$	1,175	0.231	580	0.224	-0.785	(0.01)
Sharesoutstanding $_{t+1}$	1,157	143,906.90	580	191,471.30	2.809***	47,564.40 ***

Panel C: Difference between Non-Indicted and Indicted firm

	Diff: Pre-Enforcement	**Diff: Post-Enforcement**	
	Mean Diff$_1$	Mean Diff$_2$	Diff$_1$-Diff$_2$
Patents $_{t+1}$	15.003	68.578	53.575***
Citations $_{t+1}$	66.181	196.515	130.334***
Patent Value $_{t+1}$	1627.081	1507.517	-119.564
Invest $_{t+1}$	0.039	0.017	-0.022
Leverage $_{t+1}$	-0.05	-0.002	0.048***
Shareoutstanding $_{t+1}$	175934.1	386,662.5	210,728.4***

Table 3 – Insider Trading restriction and Innovation

The sample consists of 7,674 firm-years jointly covered in the Compustat, Thomson Reuters, the NBER Patent and Citation Database between 1985 and 2005. *External restrict* represents 0 for non-indictment firm-year and 1 for the indictment firm-year. *Internal_binary* represents 0 for below 75% legal trading counts/total trading (Internal_%) and 1 for above 75% for each firm-year observation. *Leverage* is (Short-term debt + Long-term debt)/ Assets. *Log (CEO Age)* is the log (CEO age +1). *Vega* and *Delta* measures CEO compensation package. *Log (Total Assets)* is log (total assets +1). *ROA* is EBITDA/Assets. *PPE* is net Property, Plant and Equipment. *Market cap* is manually figuring the market value of Common Stock. Constant terms are included but not reported. In all regressions industry and year fixed effects are included and standard errors are robust and clustered at industry level. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Patents

	(1) $Quantity_{t+1}$	(2) $Quantity_{t+1}$	(3) $Quantity_{t+1}$	(4) $Quantity_{t+1}$	(5) $Quantity_{t+1}$
External restrict	**180.8*** **			**180.6*** **	**180.8*** **
	(11.50)			**(11.50)**	**(11.50)**
Internal binary		**11.53*** **		**11.07*** **	
		(4.150)		**(4.084)**	
Internal %			**21.06*** **		**21.03*** **
			(7.415)		(7.299)
Leverage	-83.92***	-78.39***	-77.82***	-83.23***	-82.63***
	(14.69)	(14.92)	(14.92)	(14.68)	(14.69)
Log (CEO Age)	-18.31*	-25.13**	-24.74**	-17.57	-17.14
	(10.70)	(10.86)	(10.86)	(10.70)	(10.70)
Vega	0.0208**	0.0257***	0.0257***	0.0206**	0.0206**
	(0.00927)	(0.00941)	(0.00941)	(0.00926)	(0.00926)
Delta	0.00103***	0.00101**	0.00100**	0.00103***	0.00103***
	(0.000396)	(0.000402)	(0.000402)	(0.000395)	(0.000395)
Log (Total Assets)	37.94***	40.59***	40.71***	38.00***	38.12***
	(2.647)	(2.683)	(2.684)	(2.646)	(2.647)
ROA	11.75	12.37	10.91	11.12	9.634
	(10.60)	(10.76)	(10.79)	(10.59)	(10.62)
PPE	-27.26***	-29.42***	-29.53***	-27.42***	-27.54***
	(8.539)	(8.670)	(8.671)	(8.535)	(8.535)
Market cap	-2.736	-3.857*	-4.192*	-2.682	-3.013
	(2.251)	(2.284)	(2.286)	(2.250)	(2.252)
Tobin's Q	8.202	2.592	1.543	8.071	7.026
	(12.58)	(12.77)	(12.77)	(12.57)	(12.58)
Investment	187.3***	194.6***	193.9***	188.1***	187.3***
	(14.20)	(14.42)	(14.41)	(14.20)	(14.19)
Log (Firm Age)	5.966**	5.977**	6.026**	6.491***	6.561***
	(2.510)	(2.557)	(2.558)	(2.517)	(2.518)
Volatility	127.7***	139.7***	138.9***	125.9***	125.1***
	(26.56)	(26.97)	(26.97)	(26.56)	(26.56)
Constant	-164.7***	-147.6***	-157.3***	-170.8***	-180.7***
	(49.68)	(50.48)	(50.74)	(49.70)	(49.96)
Observations	7,674	7,674	7,674	7,674	7,674
R-squared	0.199	0.174	0.174	0.200	0.200
Industry FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Panel B: Innovation Citation

	(1) Citation$_{t+1}$	(2) Citation$_{t+1}$	(3) Citation$_{t+1}$	(4) Citation$_{t+1}$	(5) Citation$_{t+1}$
External restrict	**474.0*** **			**473.5*** **	**473.9*** **
	(28.93)			**(28.93)**	**(28.92)**
Internal binary		**26.90** **		**25.70** **	
		(10.45)		**(10.27)**	
Internal %			**49.96*** **		**49.88*** **
			(18.68)		**(18.36)**
Leverage	-183.6***	-169.3***	-167.9***	-181.9***	-180.5***
	(36.95)	(37.57)	(37.58)	(36.94)	(36.95)
Log (CEO Age)	-61.21**	-79.31***	-78.35***	-59.50**	-58.44**
	(26.91)	(27.35)	(27.36)	(26.91)	(26.92)
Vega	0.0346	0.0475**	0.0476**	0.0342	0.0342
	(0.0233)	(0.0237)	(0.0237)	(0.0233)	(0.0233)
Delta	0.00610***	0.00604***	0.00603***	0.00611***	0.00611***
	(0.000995)	(0.00101)	(0.00101)	(0.000995)	(0.000994)
Log (Total Assets)	93.24***	100.2***	100.5***	93.38***	93.67***
	(6.658)	(6.758)	(6.760)	(6.656)	(6.658)
ROA	27.09	28.92	25.44	25.64	22.09
	(26.65)	(27.11)	(27.17)	(26.65)	(26.70)
PPE	-76.50***	-82.11***	-82.37***	-76.88***	-77.15***
	(21.48)	(21.84)	(21.84)	(21.47)	(21.47)
Market cap	-7.306	-10.26*	-11.05*	-7.181	-7.963
	(5.661)	(5.754)	(5.759)	(5.660)	(5.664)
Tobin's Q	-29.53	-44.19	-46.69	-29.83	-32.32
	(31.63)	(32.16)	(32.17)	(31.62)	(31.64)
Investment	418.0***	437.0***	435.2***	419.7***	418.0***
	(35.72)	(36.32)	(36.31)	(35.71)	(35.70)
Log (Firm Age)	9.502	9.375	9.511	10.72*	10.91*
	(6.315)	(6.440)	(6.443)	(6.331)	(6.333)
Volatility	332.6***	364.6***	362.8***	328.5***	326.4***
	(66.81)	(67.93)	(67.94)	(66.81)	(66.82)
Constant	-297.5**	-250.7**	-273.9**	-311.5**	-335.4***
	(125.0)	(127.1)	(127.8)	(125.0)	(125.7)
Observations	7,674	7,674	7,674	7,674	7,674
R-squared	0.189	0.161	0.161	0.189	0.189
Industry FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Table 4 – Innovation around Initial Indictment

The sample consists around 1,500 size and industry matched firm-years jointly covered in the Compustat, Thomson Reuters, the NBER Patent and Citation Database between 1985 and 2005. *Treat* represents 0 for firms that never get indicted and 1 for the indicted firms. *Post* represents 0 for years before the initial indictment and 1 for years after the initial indictment. Constant terms are included but not reported. In all regressions industry and year fixed effects are included and standard errors are robust and clustered at industry level. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Patents

	(1) $Quantity_{t+1}$	(2) $Quantity_{t+1}$	(3) $Quantity_{t+1}$	(4) $Quantity_{t+1}$
External restrict	**21.35***		**19.52**	
	(12.86)		**(27.85)**	
Restrict*Post	**67.04*****	**66.19*****	**74.74****	**61.46****
	(20.22)	**(17.18)**	**(36.75)**	**(27.11)**
Leverage	-5.601	-47.01	-129.1	217.5*
	(54.29)	(57.93)	(125.5)	(119.4)
Log (CEO Age)			-28.48	20.14
			(25.33)	(17.29)
Vega			1.741	-0.524
			(4.785)	(2.584)
Delta			-0.00626	-0.0154
			(4.785)	(2.584)
Log (Total Assets)	65.63***	24.43**	104.1***	22.82
	(9.773)	(10.67)	(21.29)	(20.09)
ROA	47.05	12.91	7.635	-51.10
	(36.13)	(31.51)	(86.78)	(61.92)
PPE	-15.91	79.29	161.6**	335.4***
	(34.09)	(55.10)	(70.46)	(109.0)
Market Cap	-0.735	5.174	5.496	7.203
	(8.763)	(7.780)	(18.80)	(14.92)
Tobin's Q	41.75	33.11	79.28	-325.4***
	(38.32)	(47.47)	(101.5)	(112.1)
Investment	394.4***	59.40	804.1***	62.99
	(50.97)	(40.20)	(116.8)	(80.47)
Log (Firm Age)	9.365	-108.1***	52.32**	-110.9
	(10.78)	(23.74)	(26.09)	(68.80)
Volatility	290.9***	114.7	952.2***	275.5
	(88.01)	(72.95)	(270.0)	(199.1)
Constant	-446.8***	47.68	-970.8***	109.3
	(75.47)	(69.82)	(216.8)	(204.2)
Observations	1,836	1,836	804	804
R-squared	0.305	0.742	0.370	0.865
Industry FE	YES		YES	
Year FE	YES	YES	YES	YES
Firm FE		YES		YES

Panel B: Innovation Measurement - Citation

	(1) $Citation_{t+1}$	(2) $Citation_{t+1}$	(3) $Citation_{t+1}$	(4) $Citation_{t+1}$
External restrict	**78.71****		**76.79**	
	(32.31)		**(71.84)**	
Restrict*Post	**182.9*****	**171.0*****	**225.7****	**140.8****
	(50.83)	**(41.83)**	**(94.82)**	**(63.26)**
Leverage	-40.76	-151.9	-195.0	418.0
	(136.4)	(141.1)	(323.8)	(278.7)
Log (CEO Age)			-77.39	53.52
			(65.36)	(40.35)
Vega			1.402	-2.732
			(12.34)	(6.030)
Delta			0.150	1.161
			(12.34)	(6.032)
Log (Total Assets)	161.5***	74.08***	257.6***	75.22
	(24.56)	(25.98)	(54.93)	(46.90)
ROA	91.74	7.540	29.43	-123.2
	(90.81)	(76.73)	(223.9)	(144.5)
PPE	-26.81	155.5	387.2**	686.4***
	(85.69)	(134.2)	(181.8)	(254.4)
Market Cap	-2.840	11.15	13.46	14.71
	(22.02)	(18.95)	(48.50)	(34.82)
Tobin's Q	49.01	106.1	-22.33	-669.8**
	(96.32)	(115.6)	(261.8)	(261.6)
Investment	868.4***	131.6	1,681***	146.8
	(128.1)	(97.88)	(301.3)	(187.8)
Log (Firm Age)	5.475	-228.1***	102.9	-181.0
	(27.10)	(57.81)	(67.31)	(160.6)
Volatility	787.0***	280.8	2,438***	866.3*
	(221.2)	(177.6)	(696.6)	(464.6)
Constant	-1,044***	-12.56	-2,226***	-125.8
	(189.7)	(170.0)	(559.3)	(476.5)
Observations	1,836	1,836	804	804
R-squared	0.289	0.752	0.338	0.884
Industry FE	YES		YES	
Year FE	YES	YES	YES	YES
Firm FE		YES		YES

Table 5 – Outside investment and Indictment

The sample consists of 5,262 firm-years jointly covered in the Compustat, Thomson Reuters, the NBER Patent and Citation Database between 1985 and 2005. *External restrict* represents 0 for non-indictment firm-year and 1 for the indictment firm-year. *Log (SHR_{t+1})* represents the log of (total outstanding shares +1). *$SEQAT_{t+1}$* represents the total shareholders' equity scaled by total assets. *Log ($CSHI_{t+1}$)* represents the log of (common shares issued +1). *Vega and Delta* is scaled by multiplying with 1,000. Constant terms are included but not reported. In all regressions industry and year fixed effects are included and standard errors are robust and clustered at industry level. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Log (SHR_{t+1})	Log (SHR_{t+1})	Log ($CSHI_{t+1}$)	Log ($CSHI_{t+1}$)	$SEQAT_{t+1}$	$SEQAT_{t+1}$
External restrict	**0.104****	**0.129*****	**0.127*****	**0.0533**	**0.0349*****	**0.0396*****
	(0.0516)	**(0.0440)**	**(0.0477)**	**(0.0421)**	**(0.00757)**	**(0.00836)**
Leverage	-0.324***	-0.134*	-0.331***	-0.130*	-0.0631***	-0.0770***
	(0.0821)	(0.0773)	(0.0760)	(0.0738)	(0.0121)	(0.0147)
Log (CEO Age)	-0.171***	0.101**	-0.107*	0.0641	0.0195**	-0.00744
	(0.0612)	(0.0468)	(0.0567)	(0.0447)	(0.00900)	(0.00889)
Vega	0.358***	0.0316	0.000351***	0.0290	0.0727***	0.0236***
	(0.0460)	(0.0210)	(0.0425)	(0.02)	(0.00675)	(0.00398)
Delta	0.00635***	-0.000122	0.00701***	0.000121	0.00166***	0.0000908
	(0.00226)	(0.00108)	(0.00209)	(0.00103)	(0.00332)	(0.000205)
Log (Total Assets)	0.445***	0.471***	0.399***	0.428***	0.0156***	-0.00227
	(0.0145)	(0.0153)	(0.0134)	(0.0146)	(0.00213)	(0.00291)
ROA	-0.788***	-0.314***	-0.733***	-0.255***	0.0170**	-0.00110
	(0.0558)	(0.0303)	(0.0517)	(0.0289)	(0.00820)	(0.00575)
PPE	-0.0745	0.319***	-0.116**	0.250***	-0.0131*	-0.0522***
	(0.0497)	(0.0827)	(0.0460)	(0.0789)	(0.00730)	(0.0157)
Market Cap	0.376***	-0.00701	0.404***	0.0552***	-0.00624***	-0.00294*
	(0.0120)	(0.00893)	(0.0111)	(0.00853)	(0.00177)	(0.00170)
Tobin's Q	-0.255***	-0.274***	-0.160**	-0.191***	-0.962***	-0.938***
	(0.0699)	(0.0698)	(0.0647)	(0.0667)	(0.0103)	(0.0133)
Investment	0.443***	-0.0685	0.374***	-0.0476	0.173***	0.0330***
	(0.0783)	(0.0435)	(0.0725)	(0.0416)	(0.0115)	(0.00827)
Log (Firm Age)	0.00402	0.542***	0.0310**	0.443***	0.000974	-0.0309***
	(0.0141)	(0.0453)	(0.0131)	(0.0433)	(0.00207)	(0.00861)
Volatility	2.721***	0.498***	2.430***	0.517***	0.0279	0.0214
	(0.132)	(0.0891)	(0.123)	(0.0851)	(0.0195)	(0.0169)
Constant	4.895***	5.492***	-2.200***	-1.176***	0.797***	1.157***
	(0.631)	(0.338)	(0.584)	(0.323)	(0.0927)	(0.0643)
Observations	5,262	5,262	5,262	5,262	5,262	5,262
R-squared	0.803	0.975	0.824	0.976	0.855	0.970
Industry FE	YES		YES		YES	
Year FE	YES	YES	YES	YES	YES	YES
Firm FE		YES		YES		YES

Table 6 – Insider Trading Restriction and Other Firm Performance

The sample consists around 8,000 firm-years jointly covered in the Compustat, Thomson Reuters, the NBER Patent and Citation Database between 1985 and 2005. *External restrict* represents 0 for non-indictment firm-year and 1 for the indictment firm-year. *Internal_binary* represents 0 for below 75% legal trading counts/total trading (Internal_%) and 1 for above 75% for each firm-year observation. *Vega and Delta* are scaled by 1000. Constant terms are included but not reported. In all regressions industry and year fixed effects are included and standard errors are robust and clustered at industry level. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Firm Fixed Effects

	(1) $Invest_{t+1}$	(2) $Invest_{t+1}$	(3) ROA_{t+1}	(4) ROA_{t+1}	(5) ROE_{t+1}	(6) ROE_{t+1}
External restrict	**0.0303*** **	**0.0320*** **		**0.0305**	**0.166** **	**0.180** **
	(0.0117)	**(0.0119)**		**(0.0244)**	**(0.0704)**	**(0.0719)**
Internal_%		**0.00139**	**0.0301** **	**0.0303** **		**0.0163**
		(0.00573)	**(0.0119)**	**(0.0119)**		**(0.0353)**
Leverage	0.0448**	0.0320*	0.0308	0.0314	0.0564	0.181
	(0.0185)	(0.0190)	(0.0394)	(0.0394)	(0.114)	(0.118)
Log (CEO Age)	-0.00310	-0.00844	-0.0131	-0.0121	0.0466	0.0526
	(0.0112)	(0.0113)	(0.0234)	(0.0234)	(0.0682)	(0.0693)
Vega	0.00893	0.00968	0.00303	0.00239	0.0154	0.0159
	(0.00656)	(0.00645)	(0.0133)	(0.0133)	(0.0394)	(0.0391)
Delta	0.000955	0.000903	-0.00323	-0.000326	-0.000	-0.0002
	(0.000376)	(0.00365)	(0.000642)	(0.000641)	(0.00192)	(0.00189)
Log (Total Assets)	-0.0152***	-0.0136***	0.0149**	0.0145*	0.0221	0.00459
	(0.00353)	(0.00357)	(0.00743)	(0.00744)	(0.0218)	(0.0224)
ROA	-0.140***	-0.149***				
	(0.00924)	(0.00913)				
PPE	0.221***	0.212***	0.0412	0.0401	-0.0536	-0.00638
	(0.0178)	(0.0182)	(0.0379)	(0.0379)	(0.109)	(0.112)
Market Cap	-0.00758***	-0.00721***	-0.00505	-0.00492	-0.0163	-0.0127
	(0.00230)	(0.00235)	(0.00478)	(0.00478)	(0.0138)	(0.0143)
Investment			0.0194	0.0192	0.222***	0.152**
			(0.0239)	(0.0239)	(0.0708)	(0.0720)
Log (Firm Age)	0.0117	0.00723	-0.0406**	-0.0417**	-0.0671	-0.0327
	(0.00921)	(0.00935)	(0.0194)	(0.0194)	(0.0557)	(0.0577)
Volatility	-0.00499	-0.0164	-0.0795	-0.0796	-0.205	-0.232
	(0.0257)	(0.0262)	(0.0544)	(0.0544)	(0.158)	(0.162)
Tobin's Q	0.0105	0.0234	-0.0860**	-0.0863**	-0.0763	-0.169
	(0.0167)	(0.0170)	(0.0350)	(0.0350)	(0.102)	(0.104)
Constant	0.153***	0.178***	0.158	0.158	0.101	0.0886
	(0.0505)	(0.0510)	(0.106)	(0.106)	(0.306)	(0.313)
Observations	8,495	7,791	7,811	7,811	8,377	7,685
R-squared	0.517	0.531	0.375	0.375	0.247	0.252
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES

Panel B: Investment Components

	(1) $R\&D_{t+1}$	(2) $CapEx_{t+1}$	(3) $Acquisitions_{t+1}$
External restrict	**130.3*** **	**0.00789** **	**392.6*** **
	(14.01)	**(0.00313)**	**(59.14)**
Internal_%	**15.72***	**0.00233**	**-57.99**
	(9.092)	**(0.00203)**	**(37.52)**
Log (CEO Age)	-57.36***	-0.0146***	6.151
	(13.31)	(0.00297)	(54.99)
Vega	0.0694***	-0.000486	0.264***
	(0.0114)	(0.00254)	(0.0481)
Delta	0.00207***	-0.000180	-0.00377*
	(0.000515)	(0.000115)	(0.00206)
Log (Total Assets)	67.18***	-0.0112***	67.42***
	(3.170)	(0.000708)	(13.18)
ROA	-100.8***	0.00216	-132.6***
	(12.51)	(0.00279)	(50.82)
PPE	-130.2***	0.175***	-352.8***
	(10.59)	(0.00236)	(43.60)
Market Cap	24.92***	0.0111***	35.27***
	(2.664)	(0.000595)	(11.07)
Tobin's Q	-10.80	0.000785	-73.13
	(15.47)	(0.00345)	(64.55)
Leverage	-179.0***	-0.0145***	425.5***
	(17.98)	(0.00401)	(75.15)
Log (Firm Age)	-0.617	-0.00464***	-0.0801
	(3.105)	(0.000693)	(12.88)
Volatility	278.6***	0.0568***	-366.2***
	(33.19)	(0.00741)	(136.0)
Constant	-255.4***	0.0774***	-501.0**
	(61.60)	(0.0138)	(254.1)
Observations	8,540	8,540	7,885
R-squared	0.417	0.492	0.089
Industry FE	YES	YES	YES
Year FE	YES	YES	YES

Panel C: Industry Fixed Effects

	(1) ROA_{t+1}	(2) ROA_{t+1}	(3) ROE_{t+1}	(4) ROE_{t+1}	(5) $Investment_{t+1}$	(6) $Investment_{t+1}$
Internal_%	**0.0445*** **	**0.0444*** **	**0.0638** **	**0.0638** **		**-0.00220**
	(0.0106)	**(0.0106)**	**(0.0293)**	**(0.0293)**		**(0.00551)**
External restrict		**0.0200**		**0.0583**	**0.0315*** **	**0.0394*** **
		(0.0167)		**(0.0461)**	**(0.00799)**	**(0.00874)**
Leverage	0.0261	0.0257	0.0858	0.0844	0.0206*	0.0232**
	(0.0214)	(0.0214)	(0.0597)	(0.0597)	(0.0107)	(0.0111)
Log (CEO Age)	0.00137	0.00223	0.0584	0.0609	-0.0233***	-0.0267***
	(0.0157)	(0.0157)	(0.0431)	(0.0432)	(0.00788)	(0.00806)
Vega	0.000354	-0.0002.21	0.0126	0.0110	0.0185***	0.0180**
	(0.000136)	(0.00136)	(0.00374)	(0.0374)	(0.00716)	(0.00711)
Delta	0.000555	0.000558	0.000729	0.000738	-0.000226	-0.000266
	(0.000583)	(0.000583)	(0.00160)	(0.00160)	(0.000391)	(0.000383)
Log (Total Assets)	-0.0103***	-0.0106***	-0.0321***	-0.0330***	-0.0246***	-0.0236***
	(0.00382)	(0.00383)	(0.0107)	(0.0107)	(0.00190)	(0.00195)
ROA					-0.234***	-0.237***
					(0.00792)	(0.00788)
PPE	0.0410***	0.0412***	0.0610*	0.0615*	0.0855***	0.0834***
	(0.0125)	(0.0125)	(0.0344)	(0.0344)	(0.00621)	(0.00638)
Market Cap	0.0177***	0.0178***	0.0542***	0.0546***	0.0239***	0.0237***
	(0.00320)	(0.00320)	(0.00893)	(0.00893)	(0.00159)	(0.00164)
Investment	-0.164***	-0.164***	-0.193***	-0.196***		
	(0.0195)	(0.0195)	(0.0548)	(0.0548)		
Log (Firm Age)	0.0139***	0.0139***	0.0107	0.0109	-0.00715***	-0.00796***
	(0.00367)	(0.00367)	(0.0102)	(0.0102)	(0.00184)	(0.00189)
Volatility	-0.631***	-0.633***	-1.388***	-1.392***	0.131***	0.120***
	(0.0368)	(0.0369)	(0.102)	(0.102)	(0.0198)	(0.0201)
Tobin's Q	-0.0727***	-0.0721***	-0.0272	-0.0254	-0.0119	-0.0140
	(0.0182)	(0.0182)	(0.0508)	(0.0509)	(0.00927)	(0.00953)
Constant	0.0519	0.0493	-0.166	-0.174	0.179***	0.190***
	(0.0724)	(0.0725)	(0.200)	(0.200)	(0.0362)	(0.0374)
Observations	7,811	7,811	7,685	7,685	8,495	7,791
R-squared	0.098	0.098	0.062	0.062	0.204	0.217
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Table 7 – Industry and Size Match with Control on CEO Compensation

The sample consists around 800 size and industry matched firm-years jointly covered in the Compustat, Thomson Reuters, the NBER Patent and Citation Database between 1985 and 2005. *External restrict* represents 0 for non-indictment firm-year and 1 for the indictment firm-year. *Internal_binary* represents 0 for below 75% legal trading counts/total tradings (*Internal_%*) and 1 for above 75% for each firm-year observation. *Internal_%* variable is generated following by the Roulstone (2003) and represents the percentage of control on regulation within firm. *Leverage* is (Short-term debt + Long-term debt)/ Assets. *CEO compensation* variable includes *logCEOage, vega, and delta. Log(Total Assets)* is log (total assets +1). *ROA* is EBITDA/Assets. *PPE* is net Property, Plant and Equipment. *Market cap* is manually figuring the market value of Common Stock (marketCap). Constant terms are included but not reported. In all regressions industry and year fixed effects are included and standard errors are robust and clustered at industry level. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) Quantity$_{t+1}$	(2) Quantity$_{t+1}$	(3) Quantity$_{t+1}$	(4) Citation$_{t+1}$	(5) Citation$_{t+1}$	(6) Citation$_{t+1}$
External restrict	**85.85*** **		**110.6*** **	**269.5*** **		**325.8*** **
	(33.15)		**(34.83)**	**(85.56)**		**(89.21)**
Internal_binary		**68.26** **	**65.66***		**160.5***	**152.8***
		(34.05)	**(33.85)**		**(87.41)**	**(86.70)**
Leverage	-122.0	-165.3	-210.4*	-167.0	-217.9	-351.0
	(125.1)	(127.3)	(127.3)	(322.8)	(326.7)	(326.0)
Log (CEO Age)	-26.00	-23.86	-17.44	-67.63	-60.57	-41.66
	(25.08)	(25.08)	(25.01)	(64.72)	(64.38)	(64.05)
Vega	1.398	1.159	1.472	0.0516	-0.257	0.665
	(4.758)	(4.748)	(4.719)	(12.28)	(12.19)	(12.09)
Delta	0.250	-1.316	-1.043	1.159	-3.132	-2.326
	(4.769)	(4.747)	(4.718)	(12.31)	(12.19)	(12.08)
Log (Total Assets)	103.2***	114.0***	104.1***	254.2***	287.9***	258.6***
	(21.25)	(20.94)	(21.04)	(54.84)	(53.76)	(53.90)
ROA	10.99	-22.53	-33.14	42.62	-37.44	-68.67
	(86.62)	(85.58)	(85.11)	(223.6)	(219.7)	(218.0)
PPE	148.0**	96.60	103.5	333.6*	213.8	234.1
	(67.69)	(69.75)	(69.35)	(174.7)	(179.1)	(177.6)
Market cap	7.260	-4.734	2.779	20.41	-14.09	8.036
	(18.62)	(18.29)	(18.33)	(48.07)	(46.94)	(46.94)
Tobin's Q	76.11	94.57	127.8	-34.82	-41.47	56.36
	(101.3)	(101.9)	(101.8)	(261.5)	(261.5)	(260.7)
Investment	820.3***	853.8***	828.2***	1,745***	1,801***	1,726***
	(114.5)	(113.1)	(112.7)	(295.5)	(290.3)	(288.6)
Log (Firm Age)	51.08*	49.57*	51.45**	98.03	87.47	93.00
	(26.02)	(25.61)	(25.45)	(67.16)	(65.73)	(65.20)
Volatility	979.5***	929.4***	873.6***	2,545***	2,487***	2,322***
	(267.1)	(269.8)	(268.7)	(689.4)	(692.6)	(688.2)
Constant	-984.1***	-960.8***	-972.4***	-2,279***	-2,215***	-2,250***
	(215.9)	(210.9)	(209.6)	(557.2)	(541.3)	(536.9)
Observations	804	757	757	804	757	757
R-squared	0.369	0.383	0.392	0.337	0.348	0.360
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Table 8 – Propensity Matched

The sample consists of 800 propensity and industry matched firm-years jointly covered in the Compustat, Thomson Reuters, the NBER Patent and Citation Database between 1985 and 2005. *External restrict* represents 0 for non-indictment firm-year and 1 for the indictment firm-year. *Internal_binary* represents 0 for below 75% legal trading counts/total tradings (*Internal_%*) and 1 for above 75% for each firm-year observation. *Internal_%* variable is generated following by the Roulstone (2003) and represents the percentage of control on regulation within firm. *Leverage* is (Short-term debt + Long-term debt)/ Assets. CEO compensation variable includes *logCEOage, vega, and delta. Log (Total Assets)* is log (total assets +1). *ROA* is EBITDA/Assets. *PPE* is net Property, Plant and Equipment. *Market cap* is manually figuring the market value of Common Stock (marketCap). Constant terms are included but not reported. In all regressions industry and year fixed effects are included and standard errors are robust and clustered at industry level. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A- Industry Fixed Effects

	(1) $Citation_{t+1}$	(2) $Citation_{t+1}$	(3) $Quantity_{t+1}$	(4) $Quantity_{t+1}$
External restrict	**522.2*** **	**453.6*** **	**180.3*** **	**154.5*** **
	(88.59)	**(85.21)**	**(33.62)**	**(32.49)**
Internal_%	**345.6****		**140.9****	
	(168.4)		**(63.93)**	
Internal_binary		**193.7****		**85.72*** **
		(82.98)		**(31.64)**
Leverage	-735.8**	-655.3**	-224.6*	-194.6
	(331.4)	(317.3)	(125.8)	(121.0)
Log (CEO Age)	-51.95	-33.47	-26.30	-19.45
	(61.05)	(58.39)	(23.17)	(22.27)
Vega	0.191	2.131	1.768	2.499
	(11.39)	(10.87)	(4.324)	(4.147)
Delta	-15.10	-17.52	-6.091	-7.061*
	(11.06)	(10.66)	(4.197)	(4.064)
Log (Total Assets)	178.4***	190.9***	69.15***	73.52***
	(52.63)	(50.86)	(19.98)	(19.40)
ROA	20.37	-54.40	13.91	-12.62
	(260.0)	(251.8)	(98.69)	(96.01)
PPE	42.20	29.28	27.61	19.61
	(170.0)	(165.0)	(64.52)	(62.93)
Market cap	55.25	41.77	20.82	15.97
	(47.37)	(45.72)	(17.98)	(17.43)
Tobin's Q	136.4	-6.974	28.73	-22.73
	(269.9)	(260.4)	(102.4)	(99.29)
Investment	1,886***	1,746***	766.0***	718.8***
	(302.1)	(289.1)	(114.7)	(110.3)
Log (Firm Age)	244.2***	228.5***	109.5***	104.4***
	(56.60)	(54.07)	(21.48)	(20.62)
Volatility	2,070***	2,073***	860.1***	859.7***
	(619.0)	(587.4)	(234.9)	(224.0)
Constant	-2,729***	-2,568***	-1,082***	-1,027***
	(643.3)	(601.7)	(244.2)	(229.5)
Observations	797	778	797	778
R-squared	0.357	0.361	0.371	0.376
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Panel B-Firm Fixed Effects

	(1) $Citation_{t+1}$	(2) $Citation_{t+1}$	(3) $Quantity_{t+1}$	(4) $Quantity_{t+1}$
External restrict	**152.6*** **	**137.5*** **	**62.69*** **	**56.65** **
	(54.19)	**(52.30)**	**(22.80)**	**(22.29)**
Internal_%	**21.26**		**13.67**	
	(80.49)		**(33.86)**	
Internal_binary		**87.69** **		**41.69** **
		(38.95)		**(16.60)**
Leverage	65.38	175.5	151.6	190.5*
	(236.9)	(230.7)	(99.65)	(98.31)
Log (CEO Age)	103.9***	119.6***	37.81***	43.42***
	(33.05)	(32.24)	(13.90)	(13.74)
Vega	-5.701	-5.626	-1.055	-1.030
	(4.889)	(4.763)	(2.057)	(2.030)
Delta	3.953	3.413	0.809	0.552
	(4.771)	(4.701)	(2.007)	(2.003)
Log (Total Assets)	27.55	40.38	-4.775	-0.432
	(39.34)	(39.19)	(16.55)	(16.70)
ROA	39.96	-11.68	0.623	-17.46
	(176.0)	(179.7)	(74.03)	(76.59)
PPE	319.7	372.5*	99.66	119.6
	(210.4)	(204.0)	(88.53)	(86.93)
Market cap	-25.04	-30.84	-2.568	-3.985
	(30.35)	(29.84)	(12.77)	(12.72)
Tobin's Q	-301.7	-423.8**	-262.3***	-304.1***
	(210.8)	(207.0)	(88.66)	(88.23)
Investment	109.0	95.22	25.15	19.31
	(170.6)	(166.2)	(71.76)	(70.84)
Log (Firm Age)	-155.3	-147.3	-103.5*	-104.4*
	(128.0)	(126.8)	(53.84)	(54.04)
Volatility	627.7*	520.4	203.9	161.0
	(374.1)	(364.0)	(157.4)	(155.1)
Constant	274.6	135.7	377.2**	331.5*
	(430.5)	(413.7)	(181.1)	(176.3)
Observations	797	778	797	778
R-squared	0.913	0.912	0.896	0.892
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Table 9 – Indictment and Innovation Around Change in Regulation

The sample consists of 25,415 firm-years using *Sarbanes- Oxley Act of 2003*, *Insider Trading and Securities Fraud Enforcement Act of 1988, and The Securities Enforcement Remedies and Penny Stock Reform Act of 1990*. Log (Total Assets) is log (total assets +1). Constant terms are included but not reported. In all regressions industry and year fixed effects are included and standard errors are robust and clustered at industry level. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Sarbanes – Oxley Act of 2002

	(1) Indictment$_{t+1}$	(2) Indictment$_{t+1}$	(3) Citation$_{t+1}$	(4) Citation$_{t+1}$	(5) Patent$_{t+1}$	(6) Patent$_{t+1}$
Sox*P(Indict-Value)	**0.0101*** **		**16.59*** **		**8.116*** **	
	(0.00348)		**(6.176)**		**(2.524)**	
Sox*P(Indict-Freq)		**0.00914** **		**15.01** **		**6.990*** **
		(0.00359)		**(6.364)**		**(2.601)**
Sox	**0.00742**	**0.00744**	**-7.289**	**-7.252**	**2.651**	**2.910**
	(0.0117)	**(0.0117)**	**(20.69)**	**(20.79)**	**(8.454)**	**(8.496)**
Internal_%	0.000509	0.000432	-1.714	-1.839	-0.145	-0.207
	(0.00189)	(0.00189)	(3.348)	(3.348)	(1.368)	(1.368)
Leverage	-0.00989	-0.00982	-21.93**	-21.81**	-6.443	-6.387
	(0.00609)	(0.00609)	(10.79)	(10.79)	(4.411)	(4.411)
Log (Total Assets)	0.00757***	0.00763***	18.81***	18.91***	6.454***	6.511***
	(0.00122)	(0.00122)	(2.163)	(2.161)	(0.884)	(0.883)
ROA	6.22e-05	-2.86e-06	-12.33**	-12.44**	-4.097*	-4.152**
	(0.00291)	(0.00291)	(5.163)	(5.163)	(2.110)	(2.110)
PPE	-0.0168***	-0.0169***	-16.50	-16.56	-6.423	-6.459
	(0.00619)	(0.00619)	(10.98)	(10.98)	(4.489)	(4.489)
Market cap	-0.00294***	-0.00293***	1.441	1.447	0.876	0.878
	(0.000857)	(0.000857)	(1.519)	(1.519)	(0.621)	(0.621)
Tobin's Q	0.00945**	0.00948**	18.73**	18.78**	6.263*	6.289*
	(0.00477)	(0.00477)	(8.455)	(8.456)	(3.455)	(3.456)
Investment	0.000239	0.000249	6.152	6.168	3.428	3.440
	(0.00436)	(0.00436)	(7.726)	(7.726)	(3.157)	(3.158)
Log (Firm Age)	0.00225	0.00237	-11.42**	-11.23**	-8.253***	-8.166***
	(0.00258)	(0.00258)	(4.571)	(4.573)	(1.868)	(1.869)
Volatility	0.0115*	0.0115*	20.56*	20.60*	8.294*	8.311*
	(0.00687)	(0.00687)	(12.18)	(12.18)	(4.979)	(4.979)
Constant	-0.0265**	-0.0270**	-40.52*	-41.45*	-5.114	-5.570
	(0.0126)	(0.0126)	(22.42)	(22.42)	(9.164)	(9.163)
Observations	25,415	25,415	25,415	25,415	25,415	25,415
R-squared	0.515	0.515	0.755	0.755	0.749	0.749
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Panel B: Sarbanes – Oxley Act of 2002 on matched sample tests

VARIABLES	(1) Citation	(2) Citation	(3) Patents	(4) Patents
SOX*Indict	192.9***	137.9***	73.48***	50.20**
	(22.92)	(50.80)	(9.812)	(19.77)
SOX	12.46	-42.13	11.24	-16.82
	(27.81)	(56.08)	(11.91)	(21.82)
Indict		336.8***		126.5***
		(18.52)		(7.205)
Internal_%	-3.484	12.42	0.0756	5.736
	(9.576)	(18.50)	(4.101)	(7.197)
Leverage	-6.144	-161.9***	4.319	-78.05***
	(31.75)	(43.32)	(13.60)	(16.86)
Log (Total Assets)	29.63***	94.49***	9.882***	36.83***
	(6.003)	(7.552)	(2.570)	(2.939)
ROA	-34.30**	-1.997	-13.90**	-0.900
	(15.13)	(26.26)	(6.481)	(10.22)
PPE	93.99***	9.436	37.10***	17.84
	(30.48)	(32.64)	(13.05)	(12.70)
Market Cap	1.942	-0.176	1.090	0.734
	(3.959)	(6.412)	(1.695)	(2.495)
Tobin's Q	-41.47	-24.77	-25.15**	9.900
	(28.35)	(36.97)	(12.14)	(14.38)
Investment	9.196	303.9***	4.712	128.8***
	(19.81)	(37.09)	(8.483)	(14.43)
Log (Firm Age)	-14.70	28.12***	-11.70*	12.75***
	(15.42)	(7.512)	(6.602)	(2.923)
Volatility	122.1***	173.0**	48.31**	72.75***
	(44.01)	(72.09)	(18.85)	(28.05)
Constant	-127.7**	-674.6***	-22.34	-284.0***
	(52.95)	(63.26)	(22.67)	(24.62)
Observations	7,814	7,814	7,814	7,814
R-squared	0.884	0.369	0.866	0.396
Firm FE	YES		YES	
Year FE	YES	YES	YES	YES
Industry FE		YES		YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel C: Acts on Insider Trading and Enforcement Remedies

	(1)	(2)	(3)	(4)	(5)	(6)
	Insider Trading and Securities Fraud Enforcement Act of 1988			The Securities Enforcement Remedies and Penny Stock Reform Act of 1990		
	$Valuation_{t+1}$	$Citation_{t+1}$	$Patent_{t+1}$	$Valuation_{t+1}$	$Citation_{t+1}$	$Patent_{t+1}$
Post*P(Indict-Freq)	**11.19*** **	**1.146*** **	**0.459*** **	**13.11*** **	**1.101*** **	**0.440*** **
	(1.165)	**(0.0878)**	**(0.0359)**	**(0.688)**	**(0.0513)**	**(0.0210)**
Post	**-148.6**	**-50.58** **	**-11.77**	**-595.9** **	**-76.69*** **	**-22.67*** **
	(276.5)	**(20.83)**	**(8.525)**	**(268.5)**	**(20.02)**	**(8.193)**
Internal_%	-16.34	-0.990	0.322	-24.49	-1.249	0.262
	(54.21)	(4.084)	(1.672)	(50.86)	(3.792)	(1.552)
Leverage	-751.3***	-24.92*	-6.456	-664.5***	-20.03	-4.633
	(187.8)	(14.15)	(5.793)	(174.1)	(12.98)	(5.314)
Log (Total Assets)	204.3***	21.21***	7.227***	166.7***	18.16***	6.110***
	(38.14)	(2.873)	(1.176)	(35.32)	(2.633)	(1.078)
ROA	125.7	-20.75**	-7.618**	92.40	-18.53**	-6.744**
	(118.5)	(8.928)	(3.655)	(106.8)	(7.964)	(3.260)
PPE	-595.0***	-21.95*	-8.749	-495.5***	-18.13	-7.357
	(174.8)	(13.17)	(5.389)	(163.6)	(12.20)	(4.994)
Market cap	52.68*	2.099	1.283	79.20***	2.890	1.560**
	(27.38)	(2.063)	(0.844)	(25.35)	(1.891)	(0.774)
Tobin's Q	408.2***	16.82	4.832	319.0**	10.64	2.355
	(155.4)	(11.70)	(4.791)	(143.1)	(10.67)	(4.368)
Investment	545.6***	9.507	5.317	515.5***	11.35	6.058
	(152.6)	(11.50)	(4.707)	(141.1)	(10.52)	(4.307)
Log (Firm Age)	-448.9***	11.90*	0.307	-242.1***	21.68***	4.574*
	(85.85)	(6.467)	(2.647)	(78.85)	(5.879)	(2.407)
Volatility	57.99	51.34***	19.78***	85.48	50.32***	19.22***
	(242.9)	(18.30)	(7.489)	(225.1)	(16.78)	(6.870)
Constant	214.3	-105.9***	-26.80**	-155.0	-109.6***	-29.78***
	(344.4)	(25.94)	(10.62)	(323.7)	(24.14)	(9.880)
Observations	20,202	20,202	20,202	21,536	21,536	21,536
R-squared	0.493	0.753	0.745	0.499	0.756	0.748
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Appendix 1 – Predicted Access to Capital on Innovation

The sample consists of 5,262 propensity and industry matched firm-years jointly covered in the Compustat, Thomson Reuters, the NBER Patent and Citation Database between 1985 and 2005. *External restrict* represents 0 for non-indictment firm-year and 1 for the indictment firm-year. *Internal_binary* represents 0 for below 75% legal trading counts/total tradings (*Internal_%*) and 1 for above 75% for each firm-year observation. *Internal_%* variable is generated following by the Roulstone (2003) and represents the percentage of control on regulation within firm. *Plgshr* is predicted log (outstanding shares +1). *Pseqat* is predicted total shareholders' equity divided by total assets. *Plgcshi* is predicted log (common share issued +1). *Plgshr, Pseqat, and Plgcshi* are predicted value from Table 5. *Leverage* is (Short-term debt + Long-term debt)/ Assets. CEO compensation variable includes *logCEOage, vega, and delta. Log (Total Assets)* is log (total assets +1). *ROA* is EBITDA/Assets. *PPE* is net Property, Plant and Equipment. *Market Cap* is manually figuring the market value of Common Stock (marketCap). Constant terms are included but not reported. In all regressions industry and year fixed effects are included and standard errors are robust and clustered at industry level. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	patents	patents	citation	citation	patents	patents	citation	citation	patents	patents	citation	citation
plgshr	1,329***	174.6***	3,470***	500.3***								
	(120.6)	(67.54)	(301.0)	(151.0)								
pseqat					3,970***	521.7***	10,365***	1,495***				
					(360.4)	(201.8)	(899.3)	(451.2)				
plgcshi									1,088***	142.9***	2,840***	409.5***
									(98.74)	(55.28)	(246.4)	(123.6)
leverage	329.0***	77.48***	904.9***	209.9***	148.5***	53.76***	433.5***	141.9***	258.0***	68.15***	719.4***	183.2***
	(43.87)	(25.38)	(109.4)	(56.76)	(30.22)	(17.93)	(75.39)	(40.09)	(38.24)	(22.30)	(95.41)	(49.86)
logCEOAGE	204.4***	36.72***	526.3***	95.94***	-100.1***	-3.300	-268.9***	-18.72	94.07***	22.21**	238.1***	54.39**
	(26.12)	(13.95)	(65.17)	(31.20)	(16.15)	(8.345)	(40.28)	(18.66)	(18.78)	(9.694)	(46.86)	(21.67)
vega	-0.468***	-0.0594**	-1.234***	-0.179***	-0.281***	-0.0349**	-0.746***	-0.109***	-0.374***	-0.0471**	-0.988***	-0.144***
	(0.0450)	(0.0245)	(0.112)	(0.0547)	(0.0289)	(0.0151)	(0.0720)	(0.0338)	(0.0368)	(0.0197)	(0.0918)	(0.0441)
delta	-0.00718***	-0.00107**	-0.0148***	-0.00318***	-0.00535***	-0.000832**	-0.00999***	-0.00249***	-0.00637***	-0.000966**	-0.0127***	-0.00287***
	(0.000940)	(0.000462)	(0.00235)	(0.00103)	(0.000811)	(0.000377)	(0.00202)	(0.000844)	(0.000881)	(0.000424)	(0.00220)	(0.000948)
lnta	-547.4***	-75.56**	-1,437***	-216.4***	-18.34***	-6.054	-56.25***	-17.19*	-390.1***	-54.90**	-1,027***	-157.1***
	(54.02)	(30.24)	(134.8)	(67.61)	(6.848)	(4.065)	(17.09)	(9.089)	(39.78)	(22.28)	(99.25)	(49.81)
roa	1,068***	134.9**	2,780***	385.7***	-47.87***	-11.70**	-132.5***	-34.18***	816.6***	101.9**	2,124***	291.3***
	(96.04)	(53.50)	(239.6)	(119.6)	(14.95)	(5.921)	(37.30)	(13.24)	(73.55)	(40.81)	(183.5)	(91.26)
ppe	81.55***	23.84*	201.1***	70.33**	34.43***	17.65	78.06**	52.59*	108.7***	27.41*	271.9***	80.55**

	(15.24)	(14.01)	(38.03)	(31.32)	(13.09)	(13.40)	(32.66)	(29.96)	(16.85)	(14.52)	(42.04)	(32.48)
lnmkcap	-504.0***	-65.63***	-1,315***	-185.6***	20.50***	3.295*	54.93***	11.92***	-444.0***	-57.73***	-1,158***	-162.9***
	(45.35)	(25.39)	(113.2)	(56.77)	(3.765)	(1.938)	(9.394)	(4.333)	(39.91)	(22.34)	(99.58)	(49.95)
q	337.9***	13.01	829.6***	65.37	3,820***	470.5**	9,920***	1,376***	172.7***	-8.692	398.3***	3.181
	(35.33)	(20.30)	(88.14)	(45.39)	(347.4)	(194.2)	(866.9)	(434.3)	(23.34)	(14.06)	(58.24)	(31.44)
invest	-378.5***	-69.56**	-1,066***	-208.7***	-475.7***	-82.33**	-1,319***	-245.3***	-197.4***	-45.77**	-592.7***	-140.5***
	(57.33)	(30.68)	(143.1)	(68.60)	(65.72)	(35.51)	(164.0)	(79.40)	(42.19)	(21.82)	(105.3)	(48.78)
logfirmage	1.783	-9.128	-0.977	-15.29	3.255	-8.935	2.865	-14.74	-26.60***	-12.86*	-75.08***	-25.98
	(3.463)	(7.260)	(8.641)	(16.23)	(3.449)	(7.254)	(8.606)	(16.22)	(4.566)	(7.519)	(11.39)	(16.81)
volatility	-3,480***	-453.5**	-9,113***	-1,303***	25.06	7.129	39.35	17.10	-2,508***	-325.6**	-6,573***	-936.4***
	(331.0)	(184.6)	(825.7)	(412.7)	(34.13)	(15.40)	(85.16)	(34.43)	(243.2)	(135.3)	(606.8)	(302.6)
Constant	-6,679***	-920.8***	-17,338***	-2,563***	-3,340***	-482.1***	-8,620***	-1,306***	2,219***	248.2*	5,892***	787.0***
	(612.6)	(334.6)	(1,528)	(748.1)	(328.1)	(169.3)	(818.7)	(378.6)	(264.2)	(133.5)	(659.1)	(298.5)
Observations	5,262	5,262	5,262	5,262	5,262	5,262	5,262	5,262	5,262	5,262	5,262	5,262
R-squared	0.183	0.956	0.177	0.964	0.183	0.956	0.177	0.964	0.183	0.956	0.177	0.964
Industry FE	YES		YES		YES		YES		YES		YES	
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE		YES		YES		YES		YES		YES		YES

Appendix 2 – Impact of Investment on Innovation

The sample consists of 5,262 propensity and industry matched firm-years jointly covered in the Compustat, Thomson Reuters, the NBER Patent and Citation Database between 1985 and 2005. *External restrict* represents 0 for non-indictment firm-year and 1 for the indictment firm-year. *Internal_binary* represents 0 for below 75% legal trading counts/total tradings (*Internal_%*) and 1 for above 75% for each firm-year observation. *Internal_%* variable is generated following by the Roulstone (2003) and represents the percentage of control on regulation within firm. *Lgshr* is log (outstanding shares +1). *Seqat* is total shareholders' equity divided by total assets. *Lgcshi* is log (common share issued +1). *Leverage* is (Short-term debt + Long-term debt)/ Assets. CEO compensation variable includes *logCEOage, vega, and delta. Log (Total Assets)* is log (total assets +1). *ROA* is EBITDA/Assets. *PPE* is net Property, Plant and Equipment. *Market Cap* is manually figuring the market value of Common Stock (marketCap). Constant terms are included but not reported. In all regressions industry and year fixed effects are included and standard errors are robust and clustered at industry level. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	$Quantity_{t+1}$	$Quantity_{t+1}$	$Citation_{t+1}$	$Citation_{t+1}$	$Quantity_{t+1}$	$Quantity_{t+1}$	$Citation_{t+1}$	$Citation_{t+1}$	$Quantity_{t+1}$	$Quantity_{t+1}$	$Citation_{t+1}$	$Citation_{t+1}$
lgshr	**41.00*** **	**17.31*** **	**105.0*** **	**32.37*** **								
	(3.323)	**(2.474)**	**(8.286)**	**(5.541)**								
seqat					**322.4*** **	**99.43*** **	**683.4*** **	**167.5*** **				
					(22.51)	**(13.01)**	**(56.48)**	**(29.19)**				
lgcshi									**45.84*** **	**16.95*** **	**117.2*** **	**31.17*** **
									(3.586)	**(2.592)**	**(8.941)**	**(5.805)**
External restrict	**134.2*** **	**15.96** **	**350.5*** **	**47.94*** **	**127.2*** **	**14.25** **	**337.6*** **	**45.48*** **	**132.6*** **	**17.29** **	**346.5*** **	**50.46*** **
	(12.40)	**(7.003)**	**(30.90)**	**(15.69)**	**(12.36)**	**(7.007)**	**(30.99)**	**(15.72)**	**(12.39)**	**(7.003)**	**(30.88)**	**(15.68)**
Leverage	-88.58***	23.18*	-186.1***	52.01*	-81.55***	28.52**	-177.0***	60.59**	-86.71***	23.07*	-181.3***	51.74*
	(19.75)	(12.28)	(49.24)	(27.50)	(19.67)	(12.30)	(49.36)	(27.58)	(19.74)	(12.29)	(49.20)	(27.52)
Log (CEO Age)	-15.59	5.132	-48.53	7.188	-28.89**	7.626	-79.81**	11.71	-17.68	5.800	-53.90	8.471
	(14.73)	(7.443)	(36.72)	(16.67)	(14.65)	(7.431)	(36.76)	(16.67)	(14.71)	(7.446)	(36.67)	(16.68)
Vega	-0.00681	0.00252	-0.0296	-0.00114	-0.0156	0.000721	-0.0417	-0.00407	-0.00821	0.00257	-0.0332	-0.00102
	(0.0111)	(0.00333)	(0.0277)	(0.00746)	(0.0111)	(0.00334)	(0.0279)	(0.00749)	(0.0111)	(0.00333)	(0.0277)	(0.00746)
Delta	0.000995*	3.75e-05	0.00658***	-6.28e-07	0.000719	2.63e-05	0.00611***	-1.98e-05	0.000934*	3.33e-05	0.00643***	-8.36e-06
	(0.000544)	(0.000172)	(0.00136)	(0.000384)	(0.000542)	(0.000171)	(0.00136)	(0.000385)	(0.000543)	(0.000172)	(0.00135)	(0.000385)
Log (Total Assets)	25.35***	-6.067**	58.73***	-9.114	38.55***	2.307	94.74***	6.501	25.30***	-5.165*	58.68***	-7.206
	(3.781)	(2.695)	(9.426)	(6.037)	(3.481)	(2.428)	(8.732)	(5.446)	(3.759)	(2.673)	(9.372)	(5.987)
ROA	52.08***	2.629	126.8***	1.462	14.26	-2.706	32.40	-8.532	53.34***	1.511	129.9***	-0.761
	(13.67)	(4.874)	(34.07)	(10.92)	(13.35)	(4.806)	(33.50)	(10.78)	(13.65)	(4.860)	(34.04)	(10.88)
PPE	-14.46	5.295	-49.74*	22.69	-13.30	16.01	-48.62	41.77	-12.20	6.583	-43.97	25.23

	(11.94)	(13.15)	(29.77)	(29.46)	(11.88)	(13.13)	(29.81)	(29.45)	(11.93)	(13.16)	(29.75)	(29.47)
Market Cap	-19.70***	0.160	-49.26***	2.812	-2.271	0.330	-5.521	3.078	-22.81***	-0.897	-57.16***	0.866
	(3.151)	(1.419)	(7.855)	(3.177)	(2.881)	(1.417)	(7.228)	(3.179)	(3.232)	(1.427)	(8.059)	(3.195)
Tobin's Q	9.581	-26.76**	-28.16	-53.32**	309.4***	61.76***	602.7***	94.98**	6.445	-28.27**	-36.22	-56.23**
	(16.82)	(11.11)	(41.94)	(24.89)	(27.37)	(16.49)	(68.65)	(36.97)	(16.79)	(11.11)	(41.87)	(24.89)
Investment	191.4***	8.891	423.4***	14.89	153.9***	4.420	351.9***	7.135	192.4***	8.513	426.0***	14.16
	(18.88)	(6.919)	(47.07)	(15.50)	(19.13)	(6.923)	(47.99)	(15.53)	(18.85)	(6.924)	(47.00)	(15.51)
Log (Firm Age)	6.956**	-17.80**	12.54	-30.81*	6.807**	-5.351	12.29	-8.102	5.699*	-15.94**	9.325	-27.11*
	(3.388)	(7.324)	(8.448)	(16.41)	(3.372)	(7.204)	(8.459)	(16.16)	(3.387)	(7.297)	(8.443)	(16.34)
Volatility	24.31	13.07	43.06	42.69	126.9***	19.56	309.6***	55.23*	24.47	12.93	43.90	42.70
	(33.08)	(14.21)	(82.48)	(31.83)	(31.67)	(14.14)	(79.46)	(31.72)	(32.96)	(14.23)	(82.18)	(31.87)
Constant	-374.6**	-161.2***	-868.5**	-291.4**	-431.0***	-181.1***	-899.7**	-307.5**	-73.09	-46.18	-96.96	-77.01
	(152.5)	(55.46)	(380.2)	(124.2)	(152.0)	(55.78)	(381.2)	(125.1)	(151.7)	(53.90)	(378.2)	(120.7)
Observations	5,262	5,262	5,262	5,262	5,262	5,262	5,262	5,262	5,262	5,262	5,262	5,262
R-squared	0.206	0.956	0.201	0.965	0.213	0.956	0.199	0.965	0.207	0.956	0.203	0.965
Industry FE	YES		YES		YES		YES		YES		YES	
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE		YES		YES		YES		YES		YES		YES