Innovation and Accounting Discretion

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Abstract

We investigate the impact of accounting discretion on managers' incentives to invest in innovative projects. Using a theoretical model in which a manager chooses between an innovative and a conventional project, we show that allowing accounting discretion incentivizes the manager to invest in the innovative project. This result derives from the intuition that accounting discretion reduces managerial myopia by insulating managers from short-term earnings pressure. We test the model empirically using the geographical distance to the Securities and Exchange Commission (SEC) office as the proxy for managers' ability to exercise accounting discretion and the closure of the SEC Seattle office as an exogenous shock to this ability. Consistent with the theoretical prediction, we find that firms located close to the Seattle office became more innovative after the office was closed compared to their counterparts located farther away from the office.

1. Introduction

This paper investigates whether accounting discretion affects managers' incentives to innovate. We broadly define accounting discretion as allowing corporate officers to manage the disclosure of accounting information through the use of either GAAP or non-GAAP assertions.[1] Our main contribution is to show that increasing accounting flexibility creates incentives to innovate. The finding is of particular interest to policy makers, because innovation is propaedeutic to economic growth and competitiveness (Grossman and Helpman, 1991) and reporting flexibility can be altered by accounting rules and regulatory enforcements. In his speech entitled "The 'Numbers Game'" former SEC Chairman Arthur Levitt warned registrants that even small earnings manipulation to meet analysts' consensus may be deemed material accounting misstatements and therefore, subject to SEC sanctions[2]. Our results suggest that relaxing enforcements and allowing certain levels of accounting discretion can be desirable under certain conditions, because it creates incentives for managers to explore innovative growth opportunities.

To investigate whether accounting discretion enhances innovation, we build a theoretical model in which a firm represented by a board of directors hires a manager to make investment decisions. The manager can invest either in a conventional project or an innovative project. Following the literature (March 1991; Levinthal and March 1993), we define the conventional project as exploitation of existing knowledge and the innovative project as exploration of new knowledge. After deciding which project to invest in, the manager receives a private signal about the state of the investment and subsequently issues an accounting report to the board to convey this signal. The manager can engage in costly activities to distort the accounting report.

[1] We use accounting discretion and flexibility interchangeably throughout the paper.
[2] The speech was given to the New York University Center for Law and Business on September 28, 1998.

Following prior research (e.g., Gao 2013; Bertomeu 2015; Caskey and Laux 2015), we assume that the manager's personal cost of manipulation is proportional to the exogenous constraints imposed on her. Such constraints can be broadly represented by regulatory oversight, market pressure, and the firm's governance structure and balance sheet characteristics, etc. The tighter the constraints, the less likely the manager can successfully tamper with the accounting report.

Since exploitation of known certainties tends to generate more predictable returns than exploration of unknown possibilities (March, 1991), we consider the conventional project a safer investment option than the innovative project. We assume that the expected return of the conventional project is not sensitive to the economic course and that the project requires only one capital infusion at the beginning of the implementation. By contrast, the expected return of the innovative project depends critically on the interim signal; the project offers a higher return if the signal shows a good progress in the investment implementation but a smaller or negative return otherwise. Being a riskier investment option, the innovative project requires two installments; one after the manager's decision to undertake the project and the other after the board has received the accounting report. The board will proceed with the second installment only if the accounting report shows an interim success, and abort the project otherwise. The manager's compensation depends on the type of the project she invested in and whether the project is successful.

We first consider a baseline model in which the manager will always truthfully reveal the private signal in the accounting report to the board. We then consider the possibility of tampering the accounting report. We find that managers are more likely to undertake innovative projects if they have the ability to disguise the interim bad news through upward manipulation of the accounting report. The result suggests that reporting flexibility insulates managers from temporary bad earnings outcome, which in turn incentivizes managers to choose riskier, more innovative projects ex ante.

Testing the model empirically is challenging. First, our model does not suggest that managers make discretionary accounting choices in order to undertake innovative projects. Rather it suggests that the mere availability of discretionary accounting choices, in case of bad earnings realizations, creates an incentive for the managers to take innovative projects *ex ante*. Therefore, the key empirical measure is managers' perceived ability to make future discretionary accounting choices, which of course is unobservable. Second, to draw causal inferences on the effect of accounting flexibility on innovation, we need an exogenous shock to the manager's perceived ability to exercise accounting discretion. Such a setting is hard to obtain empirically.

We attempt to surmount these challenges by using the geographical distance of the firm's headquarter from an SEC office as the proxy for managers' perceived ability to exercise accounting discretion. Due to resource constraints and information advantage, prior studies find that the SEC is more likely to investigate companies located close to a field office; recognizing this behavior distant firms are more likely to conduct financial misreporting than nearby firms (General Accounting Office 2007; Kedia and Rajgopal 2011). These results suggest that geographical proximity is a reasonable proxy for managers' perceived ability to exercise accounting discretion. We then use the closure of the SEC Seattle office as a plausibly exogenous shock to this ability and employ a difference-in-differences design to investigate whether accounting flexibility affects corporate innovation activities.

We use two variables to measure the firm's innovative activities. The first variable is the number of patents filed and eventually granted from the U.S. Patents and Trademarks Office.

Because patents vary greatly in their economic importance and value, our second variable is the total number of citations received by the patent.

We find that firms located near to the SEC Seattle office became more innovative than their counterparts located further away from the Seattle office after the closure of the office. Specifically, relative to companies far off from the Seattle office, companies located nearby the office file 11% more patents and receive 25.8% more citations per patent subsequent to the closure of the office. This effect is stronger for companies located within 100 km of the SEC Seattle office and is robust when compared against a sample of control firms located within 100 km of the other SEC offices.

To generalize the results, we conduct additional analyses using two alternative measures for the ability to exercise accounting discretion: the beginning net operating assets (NOA), which is a proxy for prior financial reporting bias, and the weighted average shares outstanding. Prior studies find that firms with higher levels of beginning NOA and shares outstanding face greater constraints on future earnings management (Barton and Simko 2002; Baber et al. 2011). Using these two alternative measures, we are able to empirically test our model on all the Compustat firms with non-missing required variables. Consistent with our main analysis, we find that firms with higher beginning NOA and more shares outstanding file fewer patents and receive fewer citations in the future.

Taken together, our findings are consistent with our model's prediction that allowing accounting flexibility alleviates managerial risk and enhances managers' incentives to innovate. However, we want to emphasize that our results do not suggest we should remove all accounting constraints to achieve the highest level of innovation. We follow the literature and model the costs of accounting discretion from the manager's perspective, but clearly other stakeholders (such as creditors, auditors, general public, etc.) may also bear these costs and their utility functions are not in our stylized model. Incorporating all stakeholders' utility functions to calculate the optimal level of accounting flexibility is beyond the scope of this article.

Prior research finds that managers prefer investment projects with shorter payback periods and that managers may reduce R&D expenditures and even forgo positive NPV projects in order to meet short-term market pressure (Baber et al. 1991; Poterba and Summers 1995; Graham et al. 2005; Asker et al. 2014). Our results suggest that to some extent accounting discretion can reduce managerial short termism by allowing managers to focus on long-term strategies such as innovation. Our paper also adds to recent findings in the literature on innovation. Ferreira et al. (2014) theoretically show that due to the absence of market pressure, private firms are more willing to take risky projects and therefore are more innovative than public firms. Bernstein (2015) provides consistent empirical evidence that companies become less innovative after they go public. He and Tian (2013) find that public firms with more analysts following are less innovative; Fang et al. (2014) find similar evidence for firms with more liquid shares. Manso (2011) shows that tolerance for early failure is key to motivating innovation; Tain and Wang (2014) provide supporting empirical evidence, using a sample of venture capital backed IPO firms. Aghion et al. (2013) and Lerner, Sorensen and Stromberg (2011) show that monitoring mechanisms such as institutional investors and private equity funds can improve managers' incentive to innovate. Our paper suggests that allowing accounting flexibility is another way to reduce managerial myopia and enhance corporate innovation.

Our paper is closely related to Arya, Glover, and Sunder (2003), which suggests that "earnings management may not be in the best interest of owners *ex post* when the earnings report is submitted. However, it may be in their best interest *ex ante* when they are trying to induce the manager to join the firm and exert appropriate effort (Page 113)." We show that without the ability to disguise temporary bad earnings outcome, managers would always behave myopically by choosing the safer project and missing the chance to invest in projects to the benefit of shareholders. The model provides a testable hypothesis and we identify a setting to provide empirical evidence consistent with the hypothesis.

The rest of the paper is organized as follows. Section 2 develops the model. Section 3 describes the empirical strategy and Section 4 reports the results. Section 5 conducts additional analyses and Section 6 concludes. All proofs are in Appendix A.

2. The Model

2.1. Model setup

A risk neutral board of directors hires a risk neutral manager to run a firm in the shareholders' best interest. At time 1 the manager chooses between two alternative projects: one is an innovative project (I_n) that explores new technology, methods, or possibilities, and the other is a conventional project (I_o) that exploits old technology, methods, or customs. If the manager selects the innovative project, at time 2, the firm's baseline accounting system produces a private signal about the state of the investment that only the manager observes. The signal can be either an interim success G or interim failure B. After receiving the signal the manager issues a public report to the board $R_i, i \in \{g, b\}$. The manager can engage in manipulative activities such that the accounting report deviates from the private signal she observed. We assume that the manager only manipulates the report upward; she will only misreport an interim failure as success to the board, and never misreport a success as a failure. This assumption is consistent with the idea that managers have career and reputational concerns about bad earnings outcomes, and therefore have incentives to use accounting schemes to disguise the bad outcomes.

The conventional project is a relatively safe investment in that its expected payoff, gross of the manager's compensation, is either positive or zero. The project requires only one installment (*I*) made at time 1 when the project is selected; therefore, the interim report about the state of the project produced by the manager at time 2 is not relevant to the conventional project investment decision.

By contrast, the expected gross payoff from the innovative project depends critically on the signal observed at time 2. The project is more likely to succeed and to generate a positive outcome if the signal at time 2 indicates an early success. If the interim signal indicates an early failure the project is more likely to fail and generate a loss for the firm at time 3. Because of its high risk, the innovative project requires two installments: one at time 1 when the project is chosen (*I*)[3] and the other at time 2 after the accounting report is submitted to the board (I_2). If the report indicates an interim success (G) the board will proceed with the second payment.[4] Alternatively, if the report indicates an interim failure (B) the board will abandon the innovative project without making any further payment.[5] At time 3 the outcome is realized and both the conventional and innovative projects can either succeed or fail (S_i or F_i, $i \in \{n, o\}$).

Probabilities and Assumptions: The innovative project generates a positive signal (G) at time 2 with probability γ and a negative signal (B) with probability $1-\gamma$. γ captures the risk associated with innovation. A higher level of γ increases the probability of seeing a good signal

[3] We assume the amount of the first installment is the same for the conventional and innovative projects. Allowing the possibility of different amounts between the two projects does not change the results.

[4] We assume that the board of directors commits *ex ante* to proceed with the second payment upon receiving a good report even though it is aware of the possibility of manipulation. We impose this assumption because our interest is to test whether accounting discretion affects the manager's investment decisions. Allowing the board to completely (or partially) undo the manipulation would eliminate (or reduce) incentives for manipulation and lead the manager to choose the conventional project. We also believe this assumption is reasonable empirically. A large literature shows that managers use accounting based schemes to meet market expectations, and the underlying assumption of this finding is that markets cannot completely undo these accounting schemes.

[5] As long as the first installment is not too large, namely, $I < -(1-\alpha\beta)(X_{BFn} - I_2) - \alpha\beta(X_{BSn} - I_2)$, the shareholders are better off halting the innovative project and losing the first installment if the manager's report indicates an interim failure (B). See proof in appendix A.

at time 2 and the probability of succes at time 3. In the limit, when γ approaches 1, the innovative project will produce a good signal with probability 1 and have the same probability of success at time 3 as the conventional project. In this case, the conventional and innovative projects are equally risky. Lower levels of γ indicate higher innovation risk and increase the probability of seeing a failure signal at time 2 which in turn reduces the probability of success at time 3. Therefore, for any value of $\gamma \in (0,1)$, the innovative project is less likely to succeed compared to the conventional project. This assumption is consistent with Holmstrom (1989) that innovation is unpredictable and has a high probability of failure.

If the signal at time 2 indicates an interim success (G) the manager will truthfully report to the board by issuing a good accounting report R_g. Alternatively, if the signal is an interim failure (B), the manager can choose an unobservable level of manipulation to disguise the signal and to produce a good report R_g. The manipulaiton suceeds with probability $m \in [0,1]$ and fails with probability 1-m. That is, an interim failure is reported as interim sucess R_g with probability m.With probability $1 - m$ the manipulation fails and the report truthfully reveals the interim failure R_b. We assume that tampering with the accounting report costs the manager $\frac{m^2 k}{2}$, where k is a positive constant that captures constraints on manipulation (e.g., regulatory oversight, internal control, audit stringency, the accounts available for manipulation, etc.).[6] Tigheter constraints (higher k) make it more costly for the manager to succesfully manipulate the accounting report.

At time 3 the conventional project succeeds with probability β and generates a net cash flow of $(So - I) > 0$; it fails with probability $1 - \beta$ and generates a net cash flow of $(Fo - I) =$

[6] Consistent with previous studies (e.g., Gao 2013; Bertomeu et al. 2013; Caskey and Laux 2016), we assume that the cost of manipulation is incurred before the actual manipulation takes place (or even if the manipulation does not occur). This *ex ante* cost assumption is consistent with the interpretation that the manager needs to engage in costly preparatory activities at time 1 in order to be able to manipulate the report at time 2.

0. The outcome of the innovative project is contingent on the signal observed at time 2. If the signal indicates an early success, the project succeeds with probability $P(S_n|G) = \beta$, and generates a net cash flow $(X_{GSn} - I - I_2) > 0$; it fails with probability $P(F_n|G) = 1 - \beta$ and generates a net cash flow $(X_{GFn} - I - I_2) = 0$. If the signal reveals an early failure, the project succeeds with probability $P(S_n|B) = \alpha\beta$ and generates a net cash flow $(X_{BSn} - I - I_2) > 0$; it fails with probability $P(F_n|B) = 1 - \alpha\beta$ and generates a net cash flow $(X_{BFn} - I - I_2) < 0$, where $\alpha \in (0,1)$ captures the project's sensitivity to the signal observed at time 2. The higher the value of α, the less sensitive the project's outcome to the signal. In the limit when α approaches 1 the signal does not update the probability of success or failure at time 3.[7] Therefore, for any value of $\alpha \in (0,1)$, the innovative project is more likely to succeed if the signal at time 2 is good than if the signal is bad.

Preferences: If the project fails, the manager expects no benefits regardless of the type of the project she chose $M_{fo} \sim M_{fn} = 0$. If the project succeeds, the manager benefits more from the innovative project than from the conventional project $M_{sn} > M_{so}$. Therefore, the manager has the following preferences about the investment outcomes: $M_{sn} \succ M_{so} \succ M_{fo} \sim M_{fn}$. We further normalize the manager's payoff to zero when the board abandon the innovative project after receving a bad rerport R_{b}.

To shorten the notation we define: $(X_{GSn} - I_2) = \Delta_{GSn}$; $(X_{GFn} - I_2) = \Delta_{GFn}$; $(X_{BSn} - I_2) = \Delta_{BSn}$; $(X_{BFn} - I_2) = \Delta_{BFn}$. The board of directors, that proxies for the shareholders' interest, has the following preferences: $\Delta_{GSn} \succ So \succ \Delta_{BSn} \succ \Delta_{GFn} \sim Fo \succ -I \succ \Delta_{BFn}$. The shareholders benefit the most if the innovative project succeeds following a good interim signal (*G*); but they lose the most if they proceed with the innovative project and the project fails after a

[7] $\lim\limits_{\alpha \to 1} P(S_n|B) = P(S_n|G) = P(S_n) = \beta$.

bad signal (B) has been manipulated by the manager into a good report *(R_g)*. The conventional project offers more balanced payoffs; success or failure, its payoff is either positive or zero ($So > I, Fo = I$).

2.2 Benchmark model

In the benchmark model we assume that the manager has no ability to manipulate the accounting report. This assumption mimics the case in which the constraint on manipulation is extremely tight ($k \to \infty$) and the manager can not successfully manipulate the report ($m \to 0$). We solve the problem backward starting from the manager and we compare her expected utility under the two investment alternatives. The expected utility for the manager at time 1 if she invests in the conventional project is:

$$EU_{Mo} = P(S_o)M_{so} + P(F_o)M_{fo} = M_{so}\beta \tag{1}$$

The manager's expected utility when she invests in the innovative project is:

$$EU_{Mn} = P(G, S_n)M_{sn} + P(G, F_n)M_{fn} + P(B, S_n)M_{sn} + P(B, F_n)M_{fn} = M_{sn}\beta\gamma \tag{2}$$

To compute the manager's expected surplus from investing in the innovative project we subtract equation (1) from equation (2):

$$MS_{nm} = EU_{Mn} - EU_{Mo} = \beta(M_{sn}\gamma - M_{so}) \tag{3}$$

For $\gamma < \frac{M_{so}}{M_{sn}} = \gamma_{\mathrm{M}}$ the surplus is negative suggesting that the manager is better off investing in the conventional project. That is, when innovation is very risky (γ is small) and the report to the board cannot be manipulated, the manager ex ante decides not to innovate.

We now turn to the shareholders. The shareholders' expected utility when the manager does not innovate is given by:

$$EU_{So} = P(S_o)So + P(F_o)Fo - I = \beta(So - I) \tag{4}$$

When the manager decides to innovate the shareholders' expected utility becomes:

$$\begin{aligned} EU_{Sn} &= P(G,S_n)\Delta_{GSn} + P(G,F_n)I + P(B)(0) - I \\ &= \gamma\big(\beta\Delta_{GSn} + (1-\beta)(I)\big) - I \end{aligned} \tag{5}$$

The third term in equation (5) represents the instance where the board abandons the innovative project when the accounting report indicates that a bad signal at time 2 has been received by the manager.

We substract equation (4) from equation (5) to calculate the shareholders' expected surplus from investing in the innovative project:

$$SS_{nm} = EU_{Sn} - EU_{So} = \beta(\gamma\Delta_{GSn} - \text{So}) - I(1-\gamma)(1-\beta) \tag{6}$$

For $\gamma < \frac{\beta(\text{So}-I)+I}{\beta(\Delta_{GS_n}-\text{I})+I} = \gamma_{\text{S}}$ equation (6) is always negative. That is, when the innovative project is very risky (γ is small) the shareholders are better off if the manager does not innovate.

2.3. The model with manipulation

2.3.1. Manager's investment decisions

We now turn to the scenario in which the manager can potentially manipulate the report. Because the implementation of the conventional project does not depend on the accounting report, the manager will engage in manipulation only if she invests in the innovative project. If the manager sees a bad signal (B) at time 2 she will manipulate the report. The manipulation succeeds with probability m and a good report (R_g) is issued. The manipulation fails with probability $(1-m)$ and bad report (R_b) is produced. The manager maximizes her expected utility by choosing the optimal level of manipulation that leads to the highest probability of success m^*:

$$
\begin{aligned}
EU_{Mnm} &= P(G)\big(P(S_n|G)M_{sn} + P(F_n|G)M_{fn}\big) + P(B)\big(P(S_n|B)M_{sn} + P(F_n|B)M_{fn}\big) - \tfrac{m^2k}{2} \\
&= M_{sn}(\gamma\beta + (1-\gamma)m\alpha\beta) - \tfrac{m^2k}{2}
\end{aligned} \tag{7}
$$

The first order condition with respect to m leads to the optimal choice of manipulation:

$$m^* = \frac{P(B)P(S_n|B)M_{sn}}{k} = \frac{(1-\gamma)\alpha\beta M_{sn}}{k} \tag{8}$$

m^* is decreasing in k, suggesting that increases in the level of constraint on manipulation lower the extent to which managers will exercise accounting discretion in their financial report.

Next we compute the manager's expected surplus from investing in the innovative project by plugging the optimal m^* into equation (7) and subtracting equation (1).

$$MS_m = EU_{Mnm} - EU_{Mo} = \frac{M_{sn}\beta\big(2\gamma k + \alpha^2\beta M_{sn}(\gamma-1)^2\big)}{2k} - M_{so}\beta \tag{9}$$

A sufficient condition for eqution (9) to be positive is for γ to be big enough. Specifically, for $\gamma > \gamma_{\mathrm{Mm}}$, the manager is better off investing in the innovative project. The threshold γ_{Mm} has the following properties:

Proposition 1:

(i) The threshold γ_{Mm} when the manager can manipulate is always smaller than the threshold when the manager cannot manipulate: $\gamma_{\mathrm{Mm}} < \gamma_{\mathrm{M}}$

(ii) γ_{Mm} is increasing in k and when k approaches positive infinite we obtain $\gamma_{\mathrm{Mm}} = \gamma_{\mathrm{M}}$

Part (i) of the Proposition shows that the ability to manipulate the accounting report to disguise bad news improves the incentives to innovate. For any given value of γ there are three possible cases: (1) $\gamma < \gamma_{\mathrm{Mm}} < \gamma_{\mathrm{M}}$; (2) $\gamma_{\mathrm{Mm}} < \gamma_{\mathrm{M}} < \gamma$; and (3) $\gamma_{\mathrm{Mm}} < \gamma < \gamma_{\mathrm{M}}$. In the first case $\gamma < \gamma_{\mathrm{Mm}} < \gamma_{\mathrm{M}}$, the innovative project is very risky and has a low probability of success. In this case, the manager is better off investing in the conventional project even if she knows she can manipulate the report at time 2 should the accounting system generate a bad signal. The second case $\gamma_{\mathrm{Mm}} < \gamma_{\mathrm{M}} < \gamma$ is the opposite scenario; the manager chooses to innovate regardless of her ability to manipualte, because the project is very safe and likely to succeed. The interesting case is the third one when $\gamma_{\mathrm{Mm}} < \gamma < \gamma_{\mathrm{M}}$ and the manager is better off innovating. Note that without manipulation the manager would have chosen the conventional project because $\gamma < \gamma_{\mathrm{M}}$; the ability to manipulate, if necessary, alters the investment decision.

The results suggest that allowing accounting discretion to disguise temporary bad news makes the manager's investment decisions less myopic and incents the manager to innovate. Moreover, in our model the investment decision and the potential manipulation of the report happen at different points in time. The manager invests in the innovative project not because she has manipulated the report but because she knows she will be able to do so should bad news happens in the future. This perceived ability to exercise accounting discretion mitigates the pressure to always report good news, which in turn incentivizes innovation. Our findings complement Manso (2011), who finds that tolerance for early failure is key to motivating innovation. We find that allowing accounting discretion to disguise temporary bad outcome is a mechanism to achieve this tolerance.

Part (ii) of the Proposition is intuitive and shows that when the constraint on manipulation is high (i.e., tampering with the accounting report is costly), the manager will undertake the innovative project only if it is likely to succeed. In the limit when the constraint is extremely tight, the manager does not manipulate and the two thresholds coincide.

2.3.2. Shareholders' welfare

In this section we investigate whether using accounting discretion to incentivize innovation increases or decreases shareholder welfare. The shareholders' expected utility when the manager undertakes the innovative project is:

$$\begin{aligned} EU_{Snm} &= P(G)(P(S_n|G)\Delta_{GSn} + P(F_n|G)\Delta_{GFn}) \\ &+P(B)(P(R_g)(P(S_n|B)\Delta_{BSn} + P(F_n|B)\Delta_{BFn}) \\ &+P(R_b)(0)) - \mathrm{I} \\ &= \beta\gamma\Delta_{GSn} + (1-\gamma)\big(m^*(\alpha\beta\Delta_{BSn} + (1-\alpha\beta)\Delta_{BFn})\big) + I((1-\beta)\gamma - 1) \end{aligned} \tag{10}$$

The first line of equation **Error! Reference source not found.** is the expected utility if the signal at time 2 is good, the second line represents the expected utility if the signal at time 2 is bad and the manager succesfully manipulates the report, the third line is the expected utility if the signal at time 2 is bad and the manipulation fails. Each time the manager sees a bad signal she will succesfully manipulate the report with probability m^*. If the board sees a good report it will proceed with the second installment I_2. With probability $(1-m^*)$ the manipulation fails and the board aborts the project losing I. To compute the expected surplus from investing in the innovative project we subtract equation (4) from equation (10) and obtain:

$$\begin{aligned} SS_m = \quad & EU_{Snm} - EU_{So} = \beta(\gamma\Delta_{GSn} - (So - I)) + (1-\gamma)\big(m^*(\alpha\beta\Delta_{BSn} + (1-\alpha\beta)\Delta_{BFn})\big) + \\ & I((1-\beta)\gamma - 1) \end{aligned} \tag{11}$$

A sufficient condition for the surplus to be positive is for $\gamma > \gamma_{\mathrm{Sm}}$. When the probability of success associated with the innovative project is high the shareholders are better off if the manager decides to innovate.

To asses the welfare implications of using accounting discretion to motivate innovation, we need to compare the manager's threshold (γ_{Mm}) with the shareholders' threshold (γ_{Sm}).[8] The following lemma summarizes the results.

Lemma 1 *A) When the shareholders' threshold is smaller than the manager's threshold $\gamma_{Sm} < \gamma_{Mm}$ there are four possible cases:*

(i) $\gamma < \gamma_{\mathrm{Sm}} < \gamma_{\mathrm{Mm}} < \gamma_{\mathrm{M}}$: the manager does not innovate and the shareholders' surplus is negative.

(ii) $\gamma_{\mathrm{Sm}} < \gamma < \gamma_{\mathrm{Mm}} < \gamma_{\mathrm{M}}$: the manager does not innovate and the shareholders' surplus is positive.

(iii) $\gamma_{\mathrm{Sm}} < \gamma_{\mathrm{Mm}} < \gamma < \gamma_{\mathrm{M}}$: the manager innovates and the shareholders' surplus is positive.

(iv) $\gamma_{\mathrm{Sm}} < \gamma_{\mathrm{Mm}} < \gamma_{\mathrm{M}} < \gamma$: the manager innovates and the shareholders' surplus is positive.

B) When the shareholders' threshold is bigger than the manager's threshold $\gamma_{Sm} > \gamma_{Mm}$ there are four possible cases:

(i) $\gamma < \gamma_{\mathrm{Mm}} < \gamma_{\mathrm{M}} < \gamma_{\mathrm{Sm}}$: the manager does not innovate and the shareholders' surplus is negative.

(ii) $\gamma_{\mathrm{Mm}} < \gamma < \gamma_{\mathrm{M}} < \gamma_{\mathrm{Sm}}$ the manager innovates and the shareholders' surplus is negative.

[8] We can interpret the distance between the shareholders' and the manager's thresholds as a measure of the extent to which their interests are aligned. For instance, when $\gamma_{\mathrm{Sm}} < \gamma_{\mathrm{Mm}}$ the shareholders are willing to invest in the innovative project for lower values of γ compared to the manager. For any value of $\gamma \in (\gamma_{\mathrm{Sm}}, \gamma_{\mathrm{Mm}})$ (Lemma 1 case A part ii) the manager does not innovate because γ is below her threshold. However, this is at the expense of the shareholders, because γ is above the shareholders' threshold. To avoid the uninteresting case in which the two thresholds are identical (i.e., the shareholders and manager's interests are perfectly aligned) we assume that $\gamma_{\mathrm{Sm}} \neq \gamma_{\mathrm{Mm}}$.

(iii) $\gamma_{\mathrm{Mm}} < \gamma_{\mathrm{M}} < \gamma < \gamma_{\mathrm{Sm}}$ the manager innovates and the shareholders' surplus is negative.

(iv) $\gamma_{\mathrm{Mm}} < \gamma_{\mathrm{M}} < \gamma_{\mathrm{Sm}} < \gamma$ the manager innovates and the shareholders' surplus is positive.

We use two numerical examples to illustrate both cases (A and B). Figure 1 depicts case A where $\gamma_{\mathrm{Sm}} = 0.385 < 0.449 = \gamma_{\mathrm{Mm}}$. In this case, the shareholders would benefit more from the innovative project but the manager, instead, prefers the conventional project. The bigger the distance between γ_{Sm} and γ_{Mm} the higher the probability that the manager would not innovate making the shareholders worse off. The dotted area in figure 2 represents the potential loss the shareholders face when the manager does not innovate; the solid area represents the improvement in shareholder welfare when the manager is able to manipulate the report at time 2 if needed.[9] In sum, when $\gamma_{\mathrm{Sm}} < \gamma_{\mathrm{Mm}}$ the shareholders are always better off if the manager has the ability to manipulate the report. Manipulation reduces the manager's threshold and increases the likelihood that the manager innovates, which in turn improves shareholder welfare. .

When $\gamma_{\mathrm{Sm}} > \gamma_{\mathrm{Mm}}$ we obtain the opposite results. Figure 3 depicts the case for $\gamma_{\mathrm{Mm}} = 0.449 < 0.663 = \gamma_{\mathrm{Sm}}$. Here the shareholders would benefit more from the conventional project but the manager, instead, prefers the innovative project. The bigger the distance between γ_{Sm} and γ_{Mm} the higher the probability that the manager would innovate making the shareholders worse off. The dotted area in figure 4 represents the potential loss the shareholders face when the manager innovates; the solid area represents the reduction in shareholder welfare due to the manager's ability to manipulate the report at time 2 if needed. In sum, when $\gamma_{\mathrm{Sm}} > \gamma_{\mathrm{Mm}}$ the shareholders are always worse off if the manager manipulates the report. Manipulation reduces

[9] Without manipulation the manager would innovate only for $\gamma > 0.588 = \gamma_{\mathrm{M}}$ and the area where the shareholders' surplus is positive would be smaller compared to the manipulation regime.

the manager's threshold and increases the likelihood that the manager innovates, which in turn reduces shareholders welfare.

3. Empirical Strategy

3.1 Research design

The theoretical model suggests that the ability to make discretionary accounting choices in the future improves managers' ex ante incentives to take long term investment such as innovation. Constructing empirical tests of the model is challenging because managers' *ability* to exercise accounting discretion in the future is unobservable. We attempt to overcome the empirical challenge by using the setting of the closure of the Seattle SEC office in 1994.[10] Prior studies (e.g., Kedia and Rajgopal 2011; Nguyen 2012) show that the SEC is more likely to investigate firms closer to its offices to reduce time and travel expenses. This finding is consistent with the Commission's Enforcement Manual that enforcement staff must consider travel requirements when allocating resources among investigations (SEC 2013). Recognizing this behavior, firms are more likely to adopt aggressive accounting practices and commit illegal insider trading when they are far away from the SEC offices (Kedia and Rajgopal 2011; Nguyen 2012). Therefore, the closure of an SEC office provides a plausibly exogenous shock to the neighboring companies' ability to exercise accounting discretion. If accounting flexibility incentivizes innovation, we expect that relative to companies not located close to Seattle,

[10] During the sample period in which the requisite patent data are available, the SEC also closed its Detroit office in 1988 and Houston office in 1992. We do not use these two events because they occurred before 1994 and we cannot obtain filings from the SEC EDGAR to verify the address of firms' headquarters. In addition, both offices are branch offices, with regional offices located close by (Fort Worth and Chicago) and thus, hard to identify the treatment group. By contrast, the closest SEC office to the Seattle office is in San Francisco, which is more than 12 hours driving distance.

companies located close to the Seattle SEC office become more innovative after the closure of the office.

To identify how the closure of the SEC Seattle office affects innovation, we need to account for the possibility of natural changes in innovation from year to year. A standard approach to deal with these time effects is based on the difference-in-differences methodology, under which the sample is divided into treatment and control groups. In the context of our paper, the treatment group includes all firms whose nearest SEC office is the Seattle office and the control group includes firms whose nearest SEC office is other offices. Our regression model takes the form:

$$\text{Innovation}_{i,t+n} = \alpha_t + \beta_i + \phi\, \text{SEATTLE}_i{*}\text{POST}_t + \gamma\, \text{Controls}_{it} + \varepsilon_{it} \quad \text{(A)}$$

where i indexes firm and t indexes time. α_t and β_i are year and firm fixed effects. The dependent variable of interest is innovation. Following the literature (e.g., Fang, Tian and Tice 2014; Seru 2014), we use the number of patent applications that are eventually granted and the number of citations each patent receives to proxy for innovation.[11] Because the distribution of patent counts and citations are skewed, we take the natural logarithm of the variables and denote them as NPAT and CITE.[12] Since outcomes of innovative investments takes time to resolve, we examine a firm's patenting in future 1, 3, and 5 years (i.e., n = 1, 3, and 5) after the event year

[11] Using patenting activities to capture firm innovation has now become standard in the innovation literature. An alternative measure of innovation relies input oriented metrics such as R&D expenditures. Relying on R&D expenditures may be problematic for the following reasons. First, when firms do not separately report R&D expenses the variable is missing in Compustat. Koh and Reeb (2015) find that firms that fail to report R&D expenditures in the financial statements actually have substantive amounts of research activities on average. Seru (2014) finds that multi-division firms may decentralize research activities and even move the research outside the firm by establishing strategic alliances or join ventures, both of which potentially obscure R&D activities. More importantly, the literature suggests that since not all research expenditures are well spent, output oriented measures such as patent activities are superior to R&D expenditures in capturing the quality and extent of firms' innovations (see for example, Lerner et al. 2011; Fang et al. 2014).

[12] To avoid sample attrition, we add one to the actual values of patent and citation counts when calculating the natural logarithm.

(i.e., the closure of the SEC Seattle office). SEATTLE is a dummy variable, which equals one if the firm's nearest SEC office is the Seattle office, and zero otherwise. POST is a dummy variable indicating that the observation is in or after 1994. Because the specification includes both firm and year fixed effects, it is not necessary to include the main effects of SEATTLE and POST. These variables are either time invariant (SEATTLE), which will be absorbed by the firm fixed effects, or year specific (POST), which will be absorbed by the year fixed effects.

By including firm fixed effects, equation (A) takes into account unobserved firm heterogeneity and therefore controls for any inherent differences between the treated and the control. The use of year fixed effects controls for time specific effects on innovation. The specification essentially compares the change in innovation for a firm before and after the Seattle office closure with the change for a control firm over the same period. Since we are using the natural logarithmic transformation of innovation, we estimate the percentage of innovation differential between the treatment and control firms. Under the assumption that managers of firms located close to the Seattle SEC office are afforded more accounting discretion after the closure of the office, our theoretical model predicts that these firms will become more innovative relative to their counterparts not located close to the Seattle SEC office ($\phi > 0$).

We include a set of standard control variables that may affect a firm's future innovation productivity. SIZE is the natural logarithm of sales; ROA captures profitability and is return on assets; R&D is research and development expenditures; PPE is tangible assets; LEV is the leverage ratio; CAPEX is capital expenditures; and AGE is the natural logarithm of one plus firm i's age. Appendix B lists the variable definitions. We winsorize the continuous variables at the top and bottom one percentiles to reduce the effect of outliers. Given we are running panel data, we correct standard errors to allow for clustering of errors of a given firm and of a given year (Bertrand, Duflo and Mullainathan 2004; Petersen 2009).

3.2 Sample selection and data

We specify 1991-1993 as the period before the closure of the SEC Seattle office and 1994-1996 as the period after the closure of the SEC Seattle office. We obtain the patent related data from the latest version of the National Bureau of Economics Research (NBER) Patent Citation Data File, which provides patent grants and citations from 1979 to 2006 (Hall, Jaffe and Trajtenberg 2001). The NBER patent database suffers from time truncation problems. First, patents are included in the NBER database only if they are eventually granted. Since there is an average two-year lag between patent application and patent grant, applications filed during the last few years of the sample period may still be pending and not granted by 2006. This suggests that the patent count variable is biased downward as we approach 2006. We address this issue in the following ways. First, we include year fixed effects in all analyses (Hall, Jaffe and Trajtenberg 2001). In addition, we follow the methodology in Hall, Jaffe and Trajtenberg (2005) and use the data between 1995-2000 to estimate the average grant-lag distribution. Specifically, w_s is the percentage of patents applied for in a given year that are granted in s years. We then calculate the adjusted patent counts as $P_{adj} = \frac{P_{raw}}{\sum_{s=0}^{2006-t} w_s}$, where P_{raw} is the unadjusted patent number in year t and $2001 \leq t \leq 2006$.[13] Second, since patents continue to receive citations for many years after granting, patents granted toward the end of the sample tend to have fewer citations. We address this issue by scaling up the citation counts using the weighting index "*hjtwt*" from Hall et al. (2001, 2005), also provided in the NBER patent database.

[13] Prior studies, such as Fang et al. (2014) also adopt this methodology to adjust the downward bias in NBER patent counts towards 2006.

Following previous studies (e.g., Coval and Moskowitz 2001; Loughran and Schultz 2005; Ivkovic and Weisbenner 2005; Becker, Ivkovic, and Weisbenner 2011), we use corporate headquarters to measure firm locations. We obtain the current zip code of each firm's headquarters from Compustat. Since this information is not historical, our treatment group may exclude firms once headquartered close to Seattle but now reside elsewhere. However, we believe these cases are rare as firms move infrequently. Even if these cases exist, they should bias against us finding results as the control group may include some treatment firms. For all the firms in the treatment group, we verify that they headquartered in the current zip codes during the sample period.[14] We obtain the address of each SEC office from the SEC's annual reports. There are twelve regional and district offices located in Denver, CO; Fort Worth, TX; Salt Lake City, UT; Chicago, IL; New York City, NY; Boston, MA; Philadelphia, PA; Los Angeles, CA; San Francisco, CA; Seattle, WA; Miami, FL; and Atlanta, GA, as well as the headquarters office in Washington D.C. The Seattle office was closed effective July 23, 1994.[15] We use the Haversine Formula (Sinnot 1984) to calculate the distance between a company's headquarters and the SEC offices. This formula uses the longitudes and latitudes of two locations to calculate their distance.[16] We obtain the latitudes and longitudes for the sample firms and the SEC offices from the Missouri Census Data Center.

To be included in the sample, the company needs to have non-missing accounting data from Compustat, be matched to the NBER patent database, and exist both pre and post the closure of the Seattle office. We further require the control firms be in the same industries as the

[14] We verify the address of historical headquarters from annual reports filed with the SEC. These reports are readily available through the SEC's EDGAR service from 1994.

[15] https://www.sec.gov/news/digest/1994/dig072694.pdf (accessed 9/17/2015).

[16] Presuming the longitudes and latitudes of the two locations are lon1, lat1 and lon2, lat2 in radians. The Haversine Formula calculates their distance in kilometers as d = R * 2*arcsin[min(1,$\sqrt{a}$)], where R is the radius of the earth (about 6371 kilometers), a=$[\sin(dlat/2)]^2 + \cos(lat1)*\cos(lat2)*[\sin(dlon/2)]^2$, dlon=lon2-lon1, and dlat=lat2-lat1.

treatment firm, where industries are classified by the Fama and French (1997) 48-industry classification scheme. Our final sample consists of an unbalanced panel of 3235 firms, of which 98 are the treatment and 3137 are the control. The average distance between the treatment firms and the Seattle office is about 179 km, significantly shorter than the average distance of 2907 km between the control firms and the Seattle office (p-value < 0.001, untabulated).

4. Results

4.1 Descriptive statistics

Table 1 Panel A reports the summary statistics of sample firms before the closure of the Seattle office and Panel B reports the statistics after the closure of the Seattle office. Relative to the control firms the treatment firms tend to be younger firms that borrow less, but invest more, whether measured by R&D expenditures, tangible assets, or capital expenditures. Consistent with prior studies (e.g., Hirshleifer, Low and Teoh 2012; Fang, Tian and Tice 2014), citations and patent counts have median values of zero, suggesting that the majority of the sample have zero patents. In the spirit of differences-in-differences, we compute the change in future citations and patent counts and find that changes in future 5 year citations and patent counts are significantly larger for the treatment than for the control (p-value = 0.059 for difference in $\Delta CITE_{t+5}$ and p-value = 0.041 for difference in $\Delta NPAT_{t+5}$, untabulated). However, changes in patent citations and counts in future 1 and 3 years are the same for both the treatment and the control. These results are consistent with the notion that innovation takes time to materialize and more importantly that by affording more accounting flexibility, treatment firms are more willing to initiate innovative projects than the control firms after the SEC Seattle office closes.

4.2 Regression results

Table 2 reports regression results of equation (A) with future 1, 3, and 5-year patent citations as the dependent variable. We find that relative to the control firms, the treatment firms experience a larger increase in patent citations in the future five years subsequent to the closure of the SEC Seattle office (column [3]). The magnitude of the coefficient points to economic significance. Specifically, the coefficient suggests that the closure of the SEC Seattle office is associated with a 25.8% increase in the relative future 5-year patent citations of firms located close to the office, compared with the change in relative future 5 year citations for the control firms. We do not find future 1 and 3 years patent citations change to be any different for the treatment and the control (columns [1] and [2]).

Since prior studies show that the probability of corporate misconducts is not linear in the distance to the SEC offices (Kedia and Rajgopal 2011; Nguyen 2012), we separate the treatment firms into two groups: firms located within 100 km of the Seattle office (44 firms); and those located outside 100 km of the Seattle office (54 firms). We use the dummy variables, SEATTLE(distance<=100km) and SEATTLE(distance>100 km) to represent these two groups. We then replace POST*SEATTLE with POST*SEATTLE(distance<=100km) and POST*SEATTLE(distance>100km). Column [4] shows that the results in column [3] are largely attributable to firms located within 100km of the Seattle office. The coefficient on POST*SEATTLE(distance<=100km) is positive and significant, while the coefficient on POST*SEATLE(distance>100km) is insignificant. However, we do not find the difference between the two variables statistically significant (p-value = 0.1681).

Since the SEC offices are located in large cities and firms located in large cities may be systematically different from firms located in rural areas, in column [5] we retain treatment firms that are within 100 km of the Seattle office and further restrict the control firms to be within 100 km of the other SEC offices. This specification compares changes in future citations between firms located close to the SEC Seattle office and firms located close to the other SEC offices before and after the Seattle office closure. We find that the coefficient on POST*SEATTLE remains positive and significant, which suggests that the closure of the SEATTLE office is a strong driving force of our results.

Table 3 reports the results of equation (A) with the dependent variable replaced by future 1, 3, and 5-year patent counts. The results are similar to future citations. Relative to the control firms, firms located close to the Seattle office experience a larger increase in future 5-year patent counts subsequent to the closure of the Seattle office. We do not observe changes in future 1 and 3 year patent counts differ between the treatment and control firms. Consistent with the results for citations, the increase in patent counts is largely driven by firms located within 100km of the Seattle office (column [4]). The result is robust to restricting control firms to those located close to other SEC offices (column [5]). We also find that the magnitude of the coefficient estimates on POST*SEATTLE reduces to half compared with Table 2, which suggests that the closure of the SEC Seattle office has a smaller impact on the amount of the patents filed compared to citations. This result suggests that the ability to exercise accounting discretion is more likely to affect the quality of innovation than the quantity of innovation.

Across the specifications in Tables 2 and 3, the regression model explains a large portion of the variation in innovation. Adjusted R-squares range from 78% to 89%, suggesting that our models are generally well specified. Both firm and year fixed effects absorb a large portion of the explanatory power, suggesting that innovation activities are a function of firm specific characteristics and macroeconomic conditions.

Collectively, the results in Tables 2 and 3 are consistent with our model's predictions that allowing a certain level of accounting discretion insulates the manager against temporary bad earnings realizations, which in turn reduces managerial myopia and incentivizes innovation. However, one concern with our findings is that our treatment sample is relatively small and these firms may be systematically different from general firms, making it hard to generalize our results. We address this issue in the next section.

5. Additional Analysis

We rely on the literature to derive two additional measures for the constraints on accounting discretion. Employing these two alternative measures allows us to perform the analyses on a wide cross section of firms, alleviating the concerns of generalizability.

The first measure is proposed by Barton and Simko (2002) and extended by Baber, Kang, and Li (2011). These papers suggest that managers' ability to opportunistically increase reported earnings is constrained by the extent to which net assets are already overstated on the balance sheet. This prediction stems from the fundamental characteristics of accounting that double entry system links the balance sheet with the income statement and that accounting accruals will eventually reverse. They argue that net assets reflect the cumulative effects of previous earnings discretion, because any managerial bias that increases earnings on the income statement will also increase net assets on the balance sheet. The overstated net assets limit managerial ability to manipulate future earnings when prior discretionary accruals ultimately reverse back.[17] Consistent with the argument, Barton and Simko (2002) find that firms with larger beginning balances of net operating assets are less likely to meet current quarter earnings per share (EPS)

[17] This argument also applies to downward earnings management. We focus on upward earnings management to be consistent with Barton and Simko (2002) and DeFond (2002). In addition, our model only needs latitude in upward earnings management to incentivize managers to take the innovative project.

expectations. Baber et al. (2011) further shows that the probability of meeting current earnings expectations depends upon the reversal speed of past discretionary accruals.

Our second measure of constraints on future earnings discretion is the number of shares outstanding. Managers of firms with more shares outstanding may find it more difficulty to meet or beat earnings expectations, because they need to manipulate more earnings for a given amount of increase in EPS. Consistent with this idea, both Barton and Simko (2002) and Baber et al. (2011) find that firms with more shares outstanding are less likely to meet current quarter earnings expectations.

We construct the two constraint measures following the procedures in Barton and Simko (2002) and Baber et al. (2011). NOA is the net operating assets at the beginning of the year. Higher NOA suggests larger cumulative earnings discretion from prior years and therefore, higher constraints on earnings manipulation in the future. We separate NOA into current (NOA_WC) and non-current (NOA_NC) accounts. Current, working capital accruals may be easier to manipulate than long-term accruals[18]; therefore, constraints on manipulation of current accruals may have greater effect on managers' choice of projects than constraints on manipulation of long-term accruals. $SPEED^{ST}$ is the first order autocorrelation for current discretionary accruals and $SPEED^{LT}$ is the first order autocorrelation for long-term discretionary accruals.[19] The more negative the first order autocorrelation, the faster the discretionary accruals reverse. For ease of interpretation, we multiply $SPEED^{ST}$ and $SPEED^{LT}$ by minus one, so the larger the variable, the faster the reversal. SHARES is the weighted average number of common shares outstanding in the year.

[18] Prior research finds that manipulation of working capital accruals is a common method of earnings management (e.g., DeFond and Jiambalvo 1994; Burgstahler and Dichev 1997). Both Barton and Simko (2002) and Baber et al. (2011) find that current NOA imposes greater constraints on meeting analysts' expectations than non-current NOA.
[19] We measure current and long-term discretionary accruals following the methodology in Hribar and Collins (2002) and Baber et al. (2011). See Appendix C for details.

Our sample for this analysis includes all nonfinancial, nonutility firms in Compustat with non-missing data for our test variables during 1987-2006. We start the sample period in 1987, so that we can use SFAS No. 95 statement of cash flow data to estimate accruals, rather than a balance sheet approach (Hribar and Collins 2002). We estimate discretionary accruals by industry-year and require at least 10 observations in each industry-year, where industry is defined according to the Fama and French (1997) 48-industry classifications. We exclude firms experiencing significant mergers or acquisitions during the year (i.e., annual acquisitions greater than 20 percent of the firm's assets at the beginning of the year). Baber et al. (2011) suggest that large mergers or acquisitions complicate the structure of the reversal process and may introduce additional measurement error. The final sample consists of 3993 to 5389 firms, depending on the specification.

Table 4 Panel A presents the results of the regression examining the impact of constraints on earnings discretion on patent citations in the next 1, 3, and 5 years. The coefficient estimates on NOA_WC and NOA_NC are negative and statistically significant across specifications (with the exception of column [1] where NOA_NC is not significant). The result suggests that firms with high level of earnings management in the past are faced with tighter constraints on making discretionary accounting choices in the future, which in turn reduce their incentives to select innovative projects, resulting in lower future patent citations. We also find negative coefficients on SHARES, consistent with the prediction that due to greater constraints on accounting discretion, firms with more shares outstanding are less innovative. We repeat the analysis using patent counts as the dependent variable and present the results in Panel B. The results on patent counts are similar to those on citations, except that NOA_NC become insignificant. This is consistent with prior literature's finding that current NOA imposes greater constraints on managers' ability to tamper accounting reports than long-term NOA (Barton and Simco 2001; Baber et al. 2011). We also find that SHARES is only significantly associated with patent counts in future 5 years. We do not find the reversal speed of the accruals to be related to either patents or citations. Overall, the results in Table 5 are consistent with the prediction of the model that reducing the constraints on accounting discretion incents managers to innovate.

6. Conclusion

This study investigates the effect of accounting discretion on firms' innovation. We first build a theoretical model showing that affording managers with more accounting flexibility incentivizes them to pursue more innovative projects. We test our model empirically using the geographical distance of a firm's headquarter from an SEC office to proxy for managers' ability to exercise accounting discretion and the number of patents granted and citations of those to proxy for innovation. We use the closure of the SEC Seattle office as a plausibly exogenous shock to managers' ability to exercise accounting discretion and find that firms in the close proximity of the office, which experienced a decrease in the regulatory oversight, became more innovative.

As shown in Holmstrom and Milgrom (1991), performance based incentives may not be desirable when agents are involved in multiple tasks and outcomes of some tasks are not as measurable as others. Short term earnings are easy to measure, but long term competitive advantage brought about by innovation is not. Due to career, reputational, and compensation concerns, managers always prefer safer projects that offer more predictable outcomes. Our results suggest that accounting flexibility can mitigate those concerns by reducing the pressure that managers face to meet short term earnings targets.

Innovation, whether is application of new business strategies, development of new technologies, or offering new products, is risky, but central to the growth, wealth, and competitive advantage of nations. By articulating the link between accounting discretion and innovation, this paper offers a conceptual foundation for understanding why imposing high regulatory enforcement on accurate financial reports might not always be desirable from a welfare perspective.

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Appendix A: Proofs of the Model

Benchmark Model

In the benchmark model the manager does not manipulate the report ($m = 0$) and the board of directors can either continue or abort the project after receiving the report. If the board continues the project, regardless of the content of its content, the shareholders' expected utility becomes:

$$\begin{aligned} \text{SCNM} &= P(G,S_n)\Delta_{GSn} + P(G,F_n)\Delta_{GFn} + P(B,S_n)\Delta_{BSn} + P(B,F_n)\Delta_{BFn} \\ &= \beta\gamma\Delta_{GSn} + (1-\gamma)(\alpha\beta\Delta_{BSn} + (1-\alpha\beta)\Delta_{BFn}) + \mathrm{I}((1-\beta)\gamma - 1) \end{aligned} \tag{12}$$

If the board aborts the project after receiving a bad report the expected utility becomes:

$$\begin{aligned} \text{SANM} &= P(G,S_n)\Delta_{GSn} + P(G,F_n)\Delta_{GFn} + P(B)(0) \\ &= \beta\gamma\Delta_{GSn} + \mathrm{I}((1-\beta)\gamma - 1) \end{aligned} \tag{13}$$

Assuming that the first installment I is smaller than the potential loss in case of failure, $I < -(1-\alpha\beta)\Delta_{BFn} - \alpha\beta\Delta_{BSn}$, the shareholders are better off if the board aborts the project after seeing a bad report, because the expected utility from equation (13) is greater than the expected utility from equation (12), that is $\text{SANM} - \text{SCNM} > 0$ or $(-1+\gamma)(\alpha\beta\Delta_{BSn} + (1-\alpha\beta)\Delta_{BFn}) > 0$.

We now turn to the manager. Knowing that the board aborts the project, if a bad report is produced, the manager's expected utility if she innovates becomes:

$$EU_{Mn} = P(G,S_n)M_{sn} + P(G,F_n)M_{fn} + P(B)0 = \beta\gamma M_{sn} \tag{14}$$

The manager's expected utility from the conventional project is given by:

$$EU_{Mo} = P(S_o)M_{so} + P(F_o)M_{fo} = M_{so}\beta \tag{15}$$

Without manipulation the manager innovates only if the expected utility from equation (14) is greater than the expected utility from equation (15). That is, $EU_{Mn} - EU_{Mo} > 0$ or $\beta(\gamma M_{sn} - M_{so}) > 0$. For $\gamma > \frac{M_{so}}{M_{sn}}$ the manager is better off if she innovates, however for $\gamma < \frac{M_{so}}{M_{sn}}$ she is better off investing on the conventional project. The result suggests that without manipulation the manager will engage in innovation only when the risk associated with it is relatively low (γ is bigger than the ratio of manager's outcomes from the conventional and innovative project). In sum, without manipulation ($m = 0$) the manager innovates only when $\gamma < \frac{M_{so}}{M_{sn}}$ and the board of directors aborts the innovative project each time it sees a bad report (R_b). The shareholders expect utility from the conventional project is given by:

$$EU_{So} = P(S_o)So + P(F_o)Fo = \beta(So - I) \tag{16}$$

The expected utility from the innovative project is:

$$
\begin{aligned}
EU_{Sn} &= P(G,S_n)\Delta_{GSn} + P(G,F_n)I + P(B)(0) - I \\
&= \gamma(\beta\Delta_{GSn} + (1-\beta)I) - I
\end{aligned} \tag{17}
$$

The surplus is given by the difference between equation (10) and equation (16):

$$
SS_{nm} = EU_{Sn} - EU_{So} = \beta(\gamma\Delta_{GSn} - So) - I(1-\gamma)(1-\beta) \tag{18}
$$

The surplus in equation (18) is negative for $\gamma < \frac{\beta(So-I)+I}{\beta(\Delta_{GSn}-I)+I} = \gamma_s$ and positive for $\gamma > \gamma_s$.

The Model with Manipulation

Under this setting the manager can manipulate the report. We solve the game by backwards induction starting from the manager. If the manager decides to innovate, at time 2, she can manipulate the report or truthfully report to the board. The board after receiving the report can either carry on the project and pay the second instalment or abort the project. Figures 7 and 8 depict the normal form of the game. The manager takes the board's decision to continue or abort the project as given. If the board carries on the project the manager manipulates the report only if $MMC > MNMC$. If the board aborts the project the manager manipulates the report only if $MMA > MNMA$.

We now compare the outcomes to determine the manager's best strategy. We assume that the manager engages in costly preparatory activities at time 1 before seeing the signal and before the potential manipulation occurs.

$$
\begin{aligned}
MMC \quad &= P(G)\big(P(S_n|G)M_{sn}) + P(F_n|G)M_{fn})\big) + P(B)(m(P(S_n|B)M_{sn} + P(F_n|B)M_{fn}) \\
&+(1-m)(P(S_n|B)rM_{sn} + P(F_n|B)rM_{fn}) - \tfrac{m^2k}{2} \\
&= M_{sn}(\gamma\beta + (1-\gamma)(\alpha\beta(m + (1-m)r))) - \tfrac{m^2k}{2} \\
MNMC \quad &= P(G)\big(P(S_n|G)M_{sn}) + P(F_n|G)M_{fn})\big) + P(B)(P(S_n|B)rM_{sn} + P(F_n|B)rM_{fn}) \\
&= M_{sn}(\gamma\beta + (1-\gamma)\alpha\beta r)
\end{aligned}
$$

MMC represents the manager's payoff if the board The first order condition of MMC with respect to m leads to the optimal choice of manipulation:

$$
m^* = \frac{(1-r)(1-\gamma)\alpha\beta M_{sn}}{k}
$$

Where $r \in (0,1)$ proxies for the loss in reputation that the manager bears if he does not manipulate the report and truthfully discloses a bad signal B. If $MMC > MNMC$ the manager will manipulate the report:

$$
MMC - MNMC = \frac{\alpha^2\beta^2(\gamma-1)^2(r-1)^2\mathrm{Sn}^2}{2k} > 0
$$

Under the assumption that the board will not abort the project even if the report is bad (B) the manager is better off manipulating the report.

If the board aborts the project after receiving a bad report the manager manipulates the report if $MMA > MNMA$. Where:

$$
\begin{aligned}
MMA \quad &= P(G)\big(P(S_n|G)M_{sn}) + P(F_n|G)M_{fn})\big) + P(B)(m(P(S_n|B)M_{sn} + P(F_n|B)M_{fn}) \\
&+(1-m)(0) - \tfrac{m^2 k}{2} \\
&= M_{sn}(\gamma\beta + (1-\gamma)\alpha\beta m) - \tfrac{m^2 k}{2} \\
MNMA \quad &= P(G)\big(P(S_n|G)M_{sn}) + P(F_n|G)M_{fn})\big) + P(B)0 \\
&= M_{sn}\gamma\beta
\end{aligned}
$$

The first order condition of MMA with respect to m leads to the optimal choice of manipulation:

$$m^* = \frac{(1-\gamma)\alpha\beta M_{sn}}{k}$$

The manger manipulates the report if $MMA > MNMA$ or:

$$MMA - MNMA = \frac{\alpha^2\beta^2(\gamma-1)^2\mathrm{Sn}^2}{2k} > 0$$

In sum, the manager is always better off manipulating the report regardless of the board's decision to abort or continue the project.

Knowing that the manager manipulates the report with probability 1 the board must decide whether to continue the innovative project even if it receives a bad report (R_b) or instead abort the project. The board aborts the project if $SAM > SCM$, where:

$$
\begin{aligned}
\mathrm{SCM} \quad &= P(G,S_n)\Delta_{GSn} + P(G,F_n)\Delta_{GFn} + P(B,S_n)\Delta_{BSn} + P(B,F_n)\Delta_{BFn} \\
&= \beta\gamma\Delta_{GSn} + (1-\gamma)(\alpha\beta\Delta_{BSn} + (1-\alpha\beta)\Delta_{BFn}) + \mathrm{I}((1-\beta)\gamma - 1)
\end{aligned}
\tag{19}
$$

and

$$
\begin{aligned}
\mathrm{SAM} \quad &= P(G,S_n)\Delta_{GSn} + P(G,F_n)\Delta_{GFn} + P(B)(m(P(S_n|B)\Delta_{BSn} + P(F_n|B)\Delta_{BFn}) + P(R_b)(0) \\
&= \beta\gamma\Delta_{GSn} + (1-\gamma)m^*(\alpha\beta\Delta_{BSn} + (1-\alpha\beta)\Delta_{BFn}) + \mathrm{I}((1-\beta)\gamma - 1)
\end{aligned}
\tag{20}
$$

Once again the board is better off aborting the project each time it receives a bad report (R_b) because: $SAM - SCM > 0$ or $(1-m^*)(1-\gamma)((-1+\alpha\beta)\Delta_{BFn} - \alpha\beta\Delta_{BSn}) > 0$.

In the manipulation regime the manager manipulates the report each time she sees a bad signal (B) and the board of directors aborts the project each time it sees a bad report (R_b).

We now compute the manager's expected utility from the innovative project under the assumptio that the board will abort the project after receiving a bad report:

$$
\begin{aligned}
EU_{Mnm} \quad &= P(G)\big(P(S_n|G)M_{sn}) + P(F_n|G)M_{fn})\big) + P(B)(m(P(S_n|B)M_{sn} + P(F_n|B)M_{fn}) \\
&+(1-m)(0) - \tfrac{m^2 k}{2} \\
&= M_{sn}(\gamma\beta + (1-\gamma)\alpha\beta m) - \tfrac{m^2 k}{2}
\end{aligned}
\tag{21}
$$

The first order condition of equation (21) with respect to m leads to the optimal choice of manipulation:

$$m^* = \frac{(1-\gamma)\alpha\beta M_{sn}}{k}$$

We assume that the enforcement level $k > (1-\gamma)\alpha\beta M_{sn}$ such that $0 < m^* < 1$. The manager expected utility from the conventional project is from equation (15). To compute the manager's surplus we plug the optimal m^* into equation (21) and subtract equation (15):

$$MS_m \quad = EU_{Mnm} - EU_{Mo} = \frac{M_{sn}\beta\left(2\gamma k + \alpha^2\beta M_{sn}(\gamma-1)^2\right)}{2k} - M_{so}\beta \tag{22}$$

The surplus in equation (22) is negative if $\gamma < \gamma_{Mm}$ and positive if $\gamma > \gamma_{Mm}$. Where γ_{Mm} is given by:[20]

$$\gamma_{Mm} = \frac{(\alpha^2\beta M_{sn} - k) + \sqrt{k(k + 2\alpha^2\beta(M_{so} - M_{sn}))}}{\alpha^2\beta M_{sn}} \tag{23}$$

The comparison between the thresholds with and without manipulation reveals that $\gamma_M > \gamma_{Mm}$ always:

$$\begin{aligned}\gamma_M - \gamma_{Mm} = \;& \frac{M_{so}}{M_{sn}} - \frac{(\alpha^2\beta M_{sn} - k) + \sqrt{k(k + 2\alpha^2\beta(M_{so} - M_{sn}))}}{\alpha^2\beta M_{sn}} \\ & \frac{\alpha^2\beta(M_{so} - M_{sn}) - k + \sqrt{k(k + 2\alpha^2\beta(M_{so} - M_{sn}))}}{\alpha^2\beta M_{sn}} > 0\end{aligned}$$

The result shows that allowing manipulation increase the probability that the manager decides to innovate.

We now turn to the shareholders. Their expected utility when the manager innovates is given by:

$$\begin{aligned} EU_{Snm} \quad &= P(G)(P(S_n|G)\Delta_{GSn} + P(F_n|G)\Delta_{GFn}) \\ &+P(B)(m(P(S_n|B)\Delta_{BSn} + P(F_n|B)\Delta_{BFn}) \\ &+P(R_b)(0)) \\ &= \beta\gamma\Delta_{GSn} + (1-\gamma)(m^*(\alpha\beta\Delta_{BSn} + (1-\alpha\beta)\Delta_{BFn})) + I((1-\beta)\gamma - 1) \end{aligned} \tag{24}$$

The shareholders' surplus is the difference between the expected utility from the innovative project (24) and the expected utility from the conventional project (16):

$$\begin{aligned} SS_m = EU_{Snm} - EU_{So} \quad &= \beta(\gamma\Delta_{GSn} - (So - I)) + (1-\gamma)(m^*(\alpha\beta\Delta_{BSn} + (1-\alpha\beta)\Delta_{BFn})) \\ &+I((1-\beta)\gamma - 1) \end{aligned} \tag{25}$$

The shareholders benefits more from the innovating project if $SS_m > 0$.

For $\gamma > \gamma_{Sm}$ the surplus is always positive. Where γ_{Sm} is given by:

$$\gamma_{Sm} = \frac{m(\alpha\beta\Delta_{BSn} + (1-\alpha\beta)\Delta_{BFn}) - I(1-\beta) - \beta So}{m(\alpha\beta\Delta_{BSn} + (1-\alpha\beta)\Delta_{BFn}) - I(1-\beta) - \beta\Delta_{GSn}} \tag{26}$$

or

[20] We omit the other root of equation 22 because it leads to a negative threshold γ_{Mn}.

$$\gamma_{Sm} = \frac{D-\beta So}{D-\beta\Delta_{GSn}} \tag{27}$$

Where D is the common part in the numerator and denominator of equation (26).
Ceteris paribus the higher is the expected payoff from the innovative project in case of success $\beta\Delta_{GSn}$ the lower is the threshold γ_{Sm}. A lower γ_{Sm} implies that innovation more likely benefits the shareholders. Comparing the the manager's threshold γ_{Mn} with the shareholders' threshold γ_{Sm} leads to lemma 1. When $\gamma_{Mn} < \gamma_{Sm}$ innovation is potentially not beneficial for the shareholders, when $\gamma_{Mn} > \gamma_{Sm}$ innovation is potentially beneficial for the shareholders.

Appendix B: Variable Definitions

AGE =	Natural logarithm of one plus the firm's age, approximated by the number of years listed on Compustat;
CAPEX =	Capital expenditure scaled by total assets;
CITE =	Natural logarithm of one plus the total number of citations received by the patents filed (and eventually granted) in the year;
LEV =	Total debt divided by total assets, where total debt is the sum of long term debt and current portion of the long term debt
NOA =	Total net operating assets at the beginning of the year, where total net operating assets is defined as shareholders' equity less cash and short-term investments, plus total debt;
NOA_NC =	Non-current net operating assets at the beginning of the year, where non-crrent net operating assets is the difference between NOA and NOA_WC.
NOA_WC =	Current net operating assets at the beginning of the year, where current net operating assets is the difference between current operating assets and current operating liabilities. Current operating assets is defined as current assets less cash and short-term investments. Current operating liabilities is defined as current liabilities less current portion of the long term debt.
NPAT =	Natural logarithm of one plus the total number of patents filed (and eventually granted) in the year;
PPE =	Property, plant, and equipment divided by total assets;
RD =	Research and development expenditures divided by total assets
ROA =	Operating income before depreciation divided by total assets;
SEATTLE =	Indicator variable equal to one if the firm's nearest SEC office is the Seattle office, and zero otherwise;
SEATTLE (distance <= 100 km) =	Indicator variable equal to one if the firm's nearest SEC office is the Seattle office and it is located within 100km of the Seattle office,

	and zero otherwise.
SEATTLE (distance > 100km) =	Indicator variable equal to one if the firm's nearest SEC office is the Seattle office and it is located outside 100km of the Seattle office, and zero otherwise.
SHARES =	Weighted average common shares outstanding;
SIZE =	Natural logarithm of sales.
$SPEED^{LT}$ =	Minus 1 times the first order autocorrelation for non-current discretionary accruals
$SPEED^{ST}$ =	Minus 1 times the first order autocorrelation for current discretionary accruals.

Appendix C: Estimation of Current and Long-term Discretionary Accrual Reversal Speed

We compute current and long-term accruals following the methodology in Hribar and Collins (2002). ACC is total accruals, calculated as:

$$ACC = EBXI - CFO$$

where EBXI is earnings before extraordinary items and discontinued operations; CFO is total cash from operations minus the cash portion of discontinued operations and extraordinary items. ACC_WC is current accruals, calculated as:

$$ACC\_WC = -(CHGAR + CHGINV + CHGAP + CHGTAX + CHGOTH + DEP)$$

where CHGAR is the decrease (increase) in accounts receivable; CHGINV is the decrease (increase) in inventory; CHGAP is the increase (decrease) in accounts payable; CHGTAX is the increase (decrease) in tax payable; CHGOTH is the net change in other current assets; and DEP is depreciation expense. All these variables are obtained from the statement of cash flows. ACC_NC is long-term accruals, calculated as:

$$ACC\_NC = ACC - ACC\_WC$$

We then estimate current and long-term discretionary accrual reversal speed following the procedure in Baber et al. (2011). For current discretionary accruals, we estimate the following regression model:

$$\frac{ACC\_WC}{A} = a_0 + a_1 \frac{1}{A} + a_2 \frac{\Delta Sales}{A} + \tau \tag{C1}$$

where ACC_WC is current accruals; A is lagged total assets; and ΔSales is change in sales revenue. Regression residual τ is the measure for current discretionary accruals. For long-term discretionary accruals, we estimate the following regression model:

$$\frac{ACC\_NC}{A} = b_0 + b_1 \frac{1}{A} + b_2 \frac{\Delta Sales}{A} + b_3 \frac{PPE}{A} + v \tag{C2}$$

where ACC_NC is long-term accruals; and PPE gross property, plant, and equipment. Regression residual ν is the measure for long-term discretionary accruals.

We estimate equations (C1) and (C2) by industry-year and require at least 10 observations in each industry-year, where industry is defined according to the Fama and French (1997) 48-industry classifications. Following Baber et al. (2011), we further require sample firms have no significant mergers or acquisitions during the year, defined as annual acquisitions greater than 20 percent of the firm's beginning assets. The first order autocorrelation of τ and ν is the measure for the reversal speed for current and long-term accruals.

Model Timeline

Time 1

The manager makes an investment decision: I_n or I_o

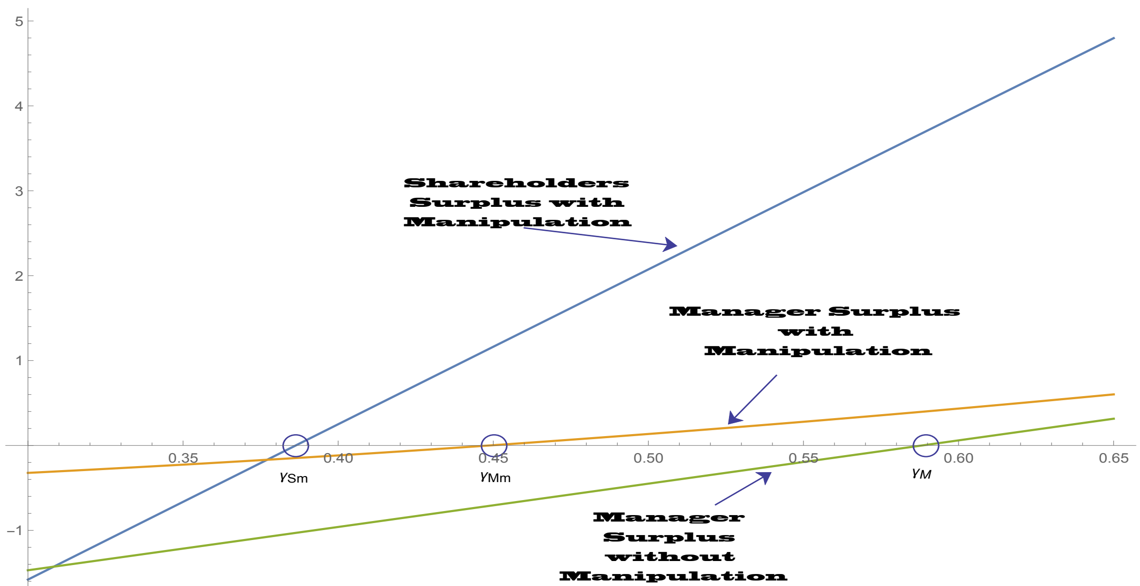
Time 2

The accounting system produces a signal about the state of the investment: $G\ or\ B$. The manager issues an accounting report to the board: R_i with $i \in (g, b)$

Time 3

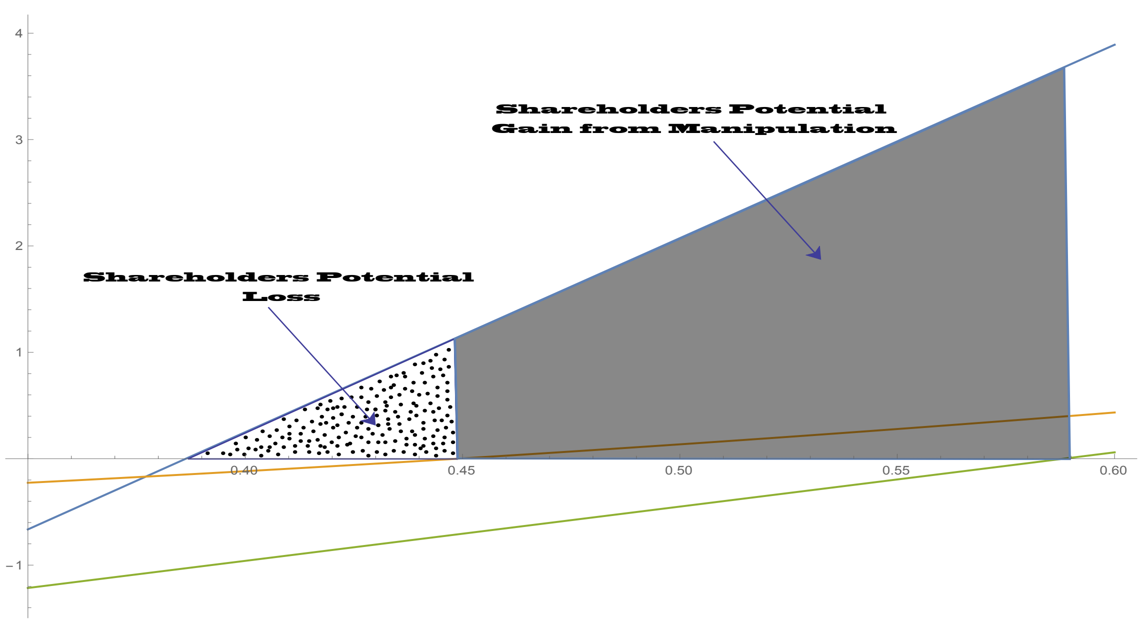
The investment outcome is realized

Figure 1: $\gamma_{Sm} = 0.385 < 0.449 = \gamma_{Mm}$



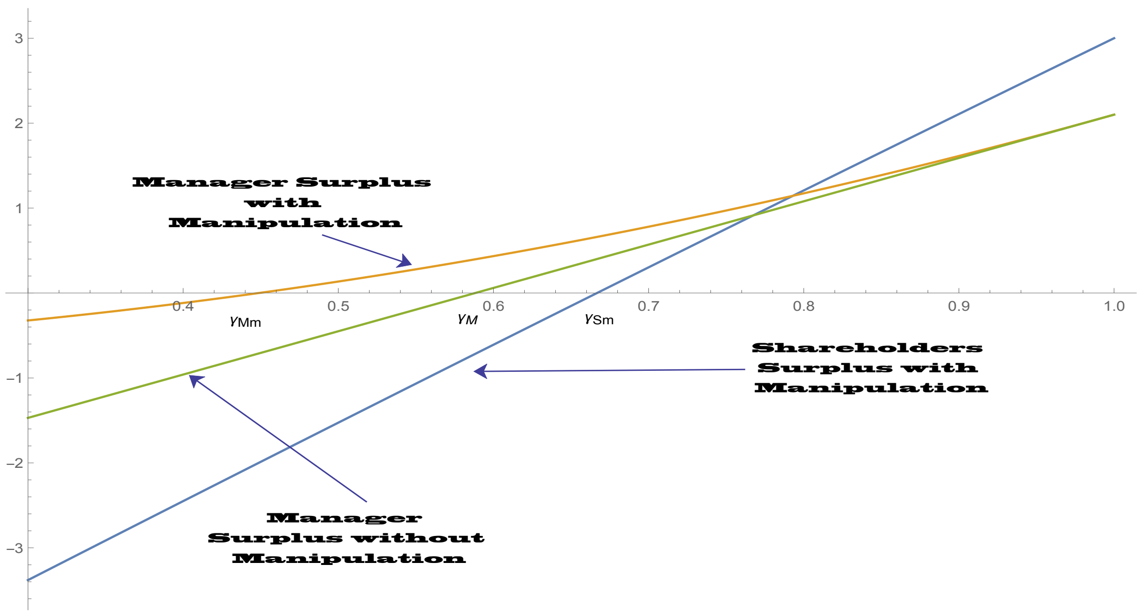
Expected shareholders and manager's surplus with and without manipulation for $\gamma \in (0.3, 0.7)$, $\alpha = .6, \beta = .3, k = 2, So = 18, Fo = 1.4, \Delta_{GSn} = 55, \Delta_{BSn} = 23, \Delta_{BFn} = -7, I = 1.4, M_{sn} = 17, M_{so} = 10.$

Figure 2: $\gamma_{Sm} = 0.385 < 0.449 = \gamma_{Mm}$



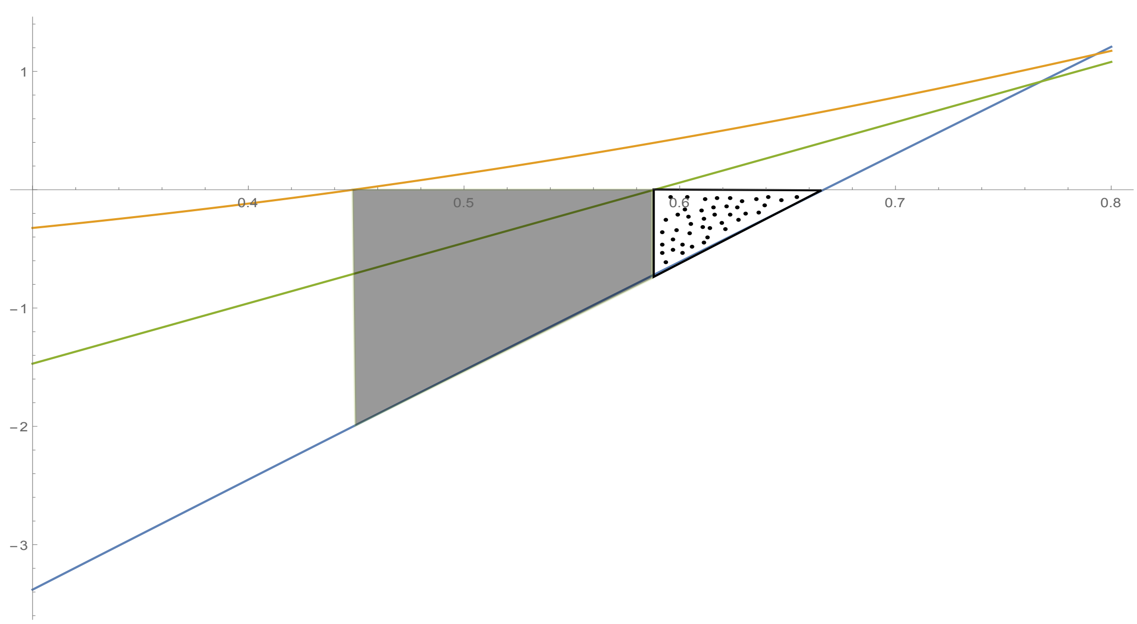
Shareholders' expected welfare increase/decrease. $\gamma \in (0.35, 0.6)$, $\alpha = .6, \beta = .3, k = 2, So = 18, Fo = 1.4, \Delta_{GSn} = 55, \Delta_{BSn} = 23, \Delta_{BFn} = -7, I = 1.4, M_{sn} = 17, M_{so} = 10.$

Figure 3: $\gamma_{Sm} = 0.668 > 0.449 = \gamma_{Mm}$



Expected shareholders and manager's surplus with and without manipulation for $\gamma \in (0.3, 1)$, $\alpha = .6, \beta = .3, k = 2, So = 15, Fo = 1.4, \Delta_{GSn} = 25, \Delta_{BSn} = 23, \Delta_{BFn} = -7, I = 1.4, M_{sn} = 17, M_{so} = 10.$

Figure 4: $\gamma_{Sm} = 0.668 > 0.449 = \gamma_{Mm}$



Shareholders' expected welfare increase/decrease. $\gamma \in (0.3, 0.8)$, $\alpha = .6, \beta = .3, k = 2, So = 15, \Delta_{GSn} = 25, \Delta_{BSn} = 23, \Delta_{BFn} = -7, I = 1.4, Fo = 1.4, M_{sn} = 17, M_{so} = 10.$

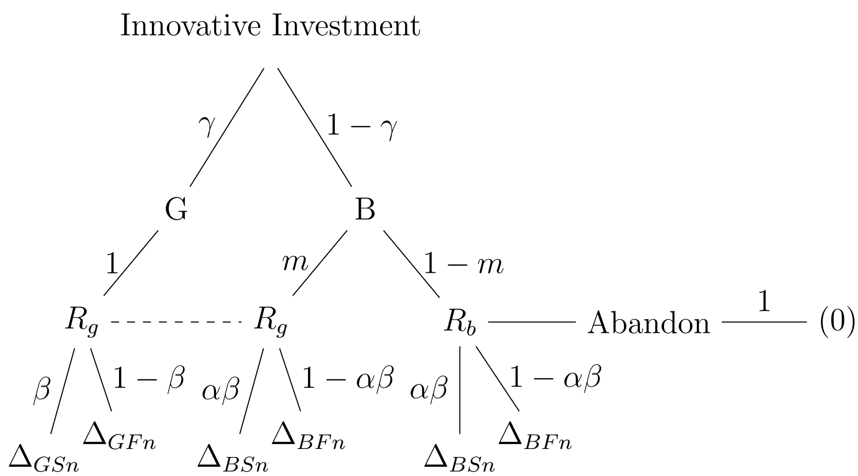


Figure 5: The figure represents the investors' extensive form game

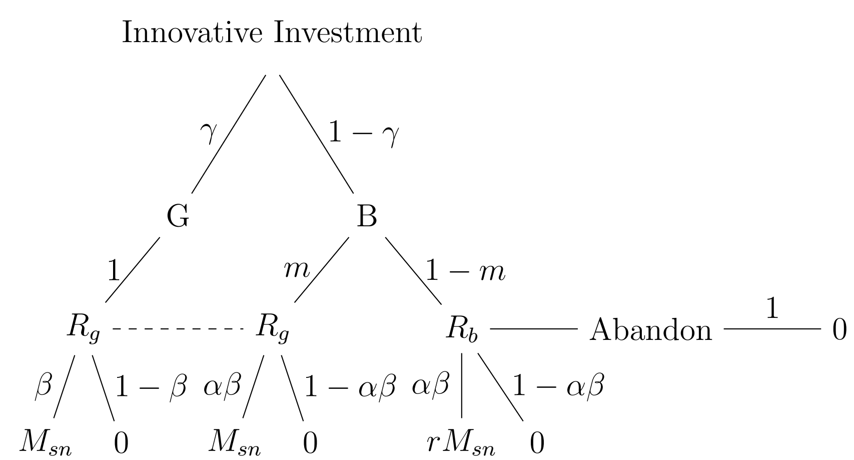


Figure 6: The figure represents the manager's extensive form game

		Board of Directors	
		Continue	Abort
Manager	Man.	MMC,SCM	MMA,SAM
	No Man.	MNMC,SCNM	MNMA,SANM

Figure 7: Normal Form Game at Time 2. MMC is the manager's outcome when she manipulates the report and the board continues the innovative project. MMA is the manager's outcome when she manipulates the report and the board aborts the innovative project. MNMC is the manager's outcome when she does not manipulate the report and the board continues the innovative project. MNMA is the manager's outcome when she does not manipulate the report and the board aborts the innovative project.

Table 1: Summary Statistics of Sample Firms

This table reports the summary statistics of sample firms. Panel A reports the statistics before the closure of the SEC Seattle office and Panel B reports the statistics after the closure of the Seattle office. All variables are defined in Appendix B.

Panel A: Summary statistics of sample firms before the closure of the SEC Seattle office

	SEATTLE = 0 (N = 8303)			SEATTLE = 1 (N = 250)			Differences in	
Variables	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median
$NPAT_{t+1}$	0.584	0	1.067	0.529	0	0.920		
$NPAT_{t+3}$	0.664	0	1.165	0.623	0	1.017		
$NPAT_{t+5}$	0.721	0	1.239	0.669	0	1.066		
$CITE_{t+1}$	1.392	0	2.215	1.375	0	2.082		
$CITE_{t+3}$	1.510	0	2.310	1.472	0	2.194		
$CITE_{t+5}$	1.548	0	2.342	1.462	0	2.203		
SIZE	4.243	4.332	2.505	4.381	4.364	2.440		
ROA	0.049	0.112	0.263	0.040	0.113	0.281		
RD	0.066	0.011	0.124	0.099	0.044	0.148	***	***
PPE	0.276	0.217	0.215	0.305	0.261	0.233	*	*
LEV	0.254	0.198	0.261	0.226	0.124	0.267		**
CAPEX	0.057	0.043	0.055	0.064	0.049	0.055	*	***
AGE	2.372	2.398	0.926	2.237	2.197	0.956	**	**

Panel B: Summary statistics of sample firms after the closure of the SEC Seattle office

	SEATTLE = 0 (N = 8146)			SEATTLE = 1 (N = 273)			Differences in	
Variables	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median
$NPAT_{t+1}$	0.682	0	1.177	0.670	0	1.014		
$NPAT_{t+3}$	0.736	0	1.239	0.721	0	1.068		
$NPAT_{t+5}$	0.783	0	1.309	0.836	0	1.184		*
$CITE_{t+1}$	1.532	0	2.322	1.612	0	2.224		
$CITE_{t+3}$	1.543	0	2.320	1.580	0	2.177		
$CITE_{t+5}$	1.409	0	2.237	1.557	0	2.166		
SIZE	4.551	4.634	2.455	4.688	4.951	2.267		
ROA	0.046	0.115	0.268	0.032	0.127	0.283		
RD	0.067	0.012	0.126	0.098	0.045	0.136	***	***
PPE	0.265	0.205	0.211	0.290	0.214	0.228	*	
LEV	0.228	0.175	0.245	0.184	0.105	0.228	**	***
CAPEX	0.061	0.045	0.057	0.065	0.049	0.053		**
AGE	2.594	2.565	0.773	2.454	2.398	0.790	***	***

Table 2: Changes in Future Patent Citations

This table presents the regression results of the differential changes in future patent citations between firms proximate to the SEC Seattle office and firms distant from the Seattle office. All variables are defined in Appendix B. Reported in brackets are *t*-statistics calculated based on White heteroskedastic consistent standard errors and adjusted for clustering by firm-year. ***, **, and * represent 1%, 5%, and 10% level of significance, respectively.

	Entire sample				Distances to the closest SEC offices <= 100 km
Dependent Variable =	$CITE_{t+1}$	$CITE_{t+3}$	$CITE_{t+5}$	$CITE_{t+5}$	$CITE_{t+5}$
	[1]	[2]	[3]	[4]	[5]
POST*SEATTLE	0.063	0.016	0.258*		0.458***
	[0.560]	[0.164]	[1.811]		[2.607]
POST*SEATTLE (distance <= 100 km)				0.463***	
				[2.658]	
POST*SEATTLE (distance > 100 km)				0.115	
				[0.585]	
SIZE	0.101***	0.062**	-0.046	-0.046	-0.025
	[4.733]	[2.475]	[-1.545]	[-1.540]	[-0.709]
ROA	0.116**	-0.073	0.181*	0.181*	0.018
	[2.027]	[-1.157]	[1.724]	[1.713]	[0.148]
RD	0.444	0.028	0.112	0.114	-0.161
	[1.619]	[0.122]	[0.523]	[0.535]	[-0.695]
PPE	-0.163	-0.271	-0.032	-0.038	-0.170
	[-1.126]	[-1.544]	[-0.206]	[-0.246]	[-0.747]
LEV	-0.060	-0.125**	-0.046	-0.043	0.052
	[-1.179]	[-1.985]	[-0.350]	[-0.328]	[0.345]
CAPEX	0.410	0.467	-0.053	-0.042	0.094
	[1.237]	[1.311]	[-0.163]	[-0.127]	[0.185]
AGE	0.277***	0.055	0.002	-0.000	-0.070
	[2.979]	[0.596]	[0.029]	[-0.003]	[-0.678]
Fixed Effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year
Observations	16,972	15,494	13,429	13,429	7,572
Adj R-squared	0.780	0.783	0.793	0.793	0.795

Table 3: Changes in Future Patent Counts

This table presents the regression results of the differential changes in future patent counts between firms proximate to the SEC Seattle office and firms distant from the Seattle office. All variables are defined in Appendix B. Reported in brackets are *t*-statistics calculated based on White heteroskedastic consistent standard errors and adjusted for clustering by firm-year. ***, **, and * represent 1%, 5%, and 10% level of significance, respectively.

	Entire sample				Distances to the closest SEC offices <= 100 km
Dependent Variable =	$NPAT_{t+1}$	$NPAT_{t+3}$	$NPAT_{t+5}$	$NPAT_{t+5}$	$NPAT_{t+5}$
	[1]	[2]	[3]	[4]	[5]
POST*SEATTLE	0.024	0.008	0.110*		0.204***
	[0.642]	[0.167]	[1.676]		[2.662]
POST*SEATTLE (distance <= 100 km)				0.211***	
				[2.862]	
POST*SEATTLE (distance > 100 km)				0.040	
				[0.432]	
SIZE	0.061***	0.035**	-0.003	-0.003	0.004
	[4.836]	[2.487]	[-0.322]	[-0.316]	[0.328]
ROA	0.025	-0.025	0.050*	0.050*	-0.001
	[1.190]	[-0.874]	[1.716]	[1.698]	[-0.031]
RD	0.187**	-0.059	0.071	0.073	0.070
	[1.973]	[-0.707]	[0.673]	[0.684]	[0.603]
PPE	-0.091	-0.124	-0.001	-0.004	-0.052
	[-1.366]	[-1.598]	[-0.017]	[-0.062]	[-0.475]
LEV	-0.005	-0.043*	-0.022	-0.021	0.026
	[-0.248]	[-1.676]	[-0.601]	[-0.564]	[0.623]
CAPEX	0.289**	0.132	-0.056	-0.050	-0.074
	[2.179]	[0.822]	[-0.413]	[-0.372]	[-0.342]
AGE	0.121***	0.053	0.077*	0.076*	0.063
	[3.060]	[1.375]	[1.931]	[1.894]	[1.240]
Fixed Effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year
Observations	16,972	15,494	13,429	13,429	7,572
Adj R-squared	0.867	0.875	0.888	0.888	0.891

Table 4: Changes in Future Patenting Activities and Constraints on Earnings Management

This table examines the association between future patenting activities and constraints on earnings management. All variables are defined in Appendix B. Reported in brackets are *t*-statistics calculated based on White heteroskedastic consistent standard errors and adjusted for clustering by firm-year. ***, **, and * represent 1%, 5%, and 10% level of significance, respectively.

Panel A: Changes in future patent citations

Dependent variable =	$CITE_{t+1}$	$CITE_{t+3}$	$CITE_{t+5}$
	[1]	[2]	[3]
NOA_WC	-0.023**	-0.028**	-0.031***
	[-2.175]	[-2.451]	[-2.697]
NOA_NC	-0.00004	-0.009**	-0.010**
	[-0.011]	[-2.052]	[-2.196]
NOA_WC*$Speed^{ST}$	0.008	0.019	0.003
	[0.241]	[0.558]	[0.078]
NOA_NC*$Speed^{LT}$	0.005	0.014	0.022
	[0.447]	[1.117]	[1.434]
SHARES	-0.001**	-0.002***	-0.003***
	[-2.074]	[-3.271]	[-4.673]
SIZE	0.045***	0.014	-0.047**
	[2.647]	[0.782]	[-2.231]
ROA	0.048*	0.019	0.000
	[1.723]	[0.607]	[0.009]
RD	0.297***	0.111	-0.227*
	[3.298]	[1.037]	[-1.929]
PPE	-0.101	0.159	0.190
	[-1.125]	[1.374]	[1.222]
LEV	-0.057*	-0.046	-0.045
	[-1.666]	[-1.131]	[-0.956]
CAPEX	0.636***	0.831***	0.598***
	[3.737]	[4.089]	[2.737]
AGE	0.344***	0.353***	0.417***
	[3.661]	[3.515]	[3.835]
Fixed Effects	Firm, Year	Firm, Year	Firm, Year
Observations	47,683	37,888	29,347
Adj R-squared	0.653	0.667	0.681

Panel B: Changes in future patent counts

Dependent variable =	$NPAT_{t+1}$	$NPAT_{t+3}$	$NPAT_{t+5}$
	[1]	[2]	[3]
NOA_WC	-0.008**	-0.015***	-0.013***
	[-1.966]	[-2.807]	[-2.665]
NOA_NC	0.003	-0.003	0.001
	[1.619]	[-1.479]	[0.390]
NOA_WC*$Speed^{ST}$	0.001	-0.011	0.012
	[0.077]	[-0.587]	[0.708]
NOA_NC*$Speed^{LT}$	-0.001	0.006	0.011*
	[-0.250]	[0.996]	[1.694]
SHARES	0.000	-0.0002	-0.001**
	[0.903]	[-0.828]	[-2.347]
SIZE	0.054***	0.033***	0.008
	[5.779]	[3.299]	[0.743]
ROA	-0.003	-0.005	-0.005
	[-0.209]	[-0.393]	[-0.319]
RD	0.130***	0.103**	-0.037
	[3.355]	[2.157]	[-0.664]
PPE	-0.098***	-0.006	0.085
	[-2.657]	[-0.143]	[1.376]
LEV	-0.038***	-0.045***	-0.033*
	[-2.669]	[-2.712]	[-1.773]
CAPEX	0.239***	0.187**	0.150
	[3.723]	[2.386]	[1.628]
AGE	0.139***	0.125***	0.145***
	[3.370]	[2.735]	[3.151]
Fixed Effects	Firm, Year	Firm, Year	Firm, Year
Observations	47,683	37,888	29,347
Adj R-squared	0.774	0.784	0.796