Dancing with Shackles On: Compensation Recovery and Corporate Investment

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ABSTRACT

We examine how clawback provisions, as an ex-post penalty scheme, affect corporate investment strategies. On the one hand, we show one unintended consequence of clawback provisions that future output level of innovative activities declines. On the other hand, we find that clawback provisions improve the output quality of innovative activities. In addition, we employ a difference-in-difference approach depending on the imposition of clawback policy in the section 954 of the Dodd-Frank Act. Finally, we use mergers and acquisitions (M&As) as an alternative corporate investment decision and find consistent results that clawback provisions reduce the frequency of deals but increase their market announcement returns. Overall, with clawback provisions, executives become more prudent and invest more cautiously, leading to lower investment levels but higher investment quality.

Keywords: Compensation Clawback Provisions, Policy and Regulations, Innovation

JEL Classifications: M52, G38, O31

Warren Buffett said, “Too often, executive compensation in the U.S. is ridiculously out of line with performance.” To better mitigate the traditional principle-agent problem between shareholders and mangers, for decades economists have been working on the optimal compensation contract that provides ex-ante incentives, e.g., pay-performance sensitivity or compensation convexities to encourage risk-taking (Holmstrom, 1979; Shavell, 1979; Jensen and Murphy,1990; Hall and Liebman, 1998; Amihud and Lev, 1981; Guay, 1999; and others). However, how ex-post consequences of penalty schemes affect executives’ ex-ante incentives and corporate strategies has been far less studied. This paper employs clawbacks as one penalty scheme to examine their modifying effects on executives’ ex-ante incentives and then on corporate strategies.

According to Goodhart’s Law, when a measure becomes a target, it ceases to be a good measure (Goodhart, 1984). In particular, the compensation that executives receive is usually based on decisions that they themselves make. Therefore, it is indispensable to complement incentive contracts with penalty schemes to effectively prevent executives from expropriating shareholders’ value. From the perspective of compensation recovery or clawback provisions, this paper is one of very few studies examining the optimal contract by incorporating provisions of an ex-post punishment scheme.

Clawback provisions are designed to ex-post recoup the incentive-based part of payments from executives when corporate governance fails, and frauds or financial restatements occur. After several notorious corporate scandals in early 2000 and the

financial crisis in 2008, the U.S. government has undertaken several Congressional actions to promote clawback provisions, such as Section 304 of the Sarbanes-Oxley Act (SOX) of 2002 and Section 954 of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) in 2010. When Section 304 of the SOX Act first authorized the Securities and Exchange Commission (SEC) to enforce clawbacks, it was only for CEOs and CFOs of public companies engaged in misconduct. However, the SEC began to enforce it aggressively, even to disgorge excess compensation of executives not involved in any misconduct in later years.[1] Moreover, the SEC proposed rule 10D-1 to implement Section 954 of Dodd-Frank, which requires exchanges to delist any firms without clawbacks in 2015. Faced with this pressure from regulators, an increasing number of firms have voluntarily adopted clawback provisions. For example, 89% of *Fortune* 100 firms adopted clawback policies in 2013, up from 18% in 2006.[2]

As summarized by Edmans, Gabaix and Jenter (2017), a significant proportion of equity compensation is performance-based. For example, the vesting of restricted stock usually depends on earnings-based performance. Since managers are likely to manipulate earnings numbers, complementary ex-post governance mechanisms, like clawback provisions, become compelling. Consistently, clawback provisions have improved firms' financial reporting quality by reducing the likelihood of financial restatements and increasing earnings response coefficients (Chan et al., 2012; Dehaan,

[1]http://www.mondaq.com/unitedstates/x/214650/Executive+Remuneration/CEOs+And+CFOs+Beware+Court+Endorses+SECs+Aggressive+Use+Of+Section+304+Of+SarbanesOxley+To+Clawback+Compensation+Of+Executives+Who+Did+Not+Engage+In+Misconduct.

[2]http://www.alixpartners.com/en/Publications/AllArticles/tabid/635/articleType/ArticleView/articleId/1059/Clawbacks-in-Focus-How-Companies-Can-Link-Executive-Compensation-to-Compliance.aspx#sthash.bp3aor6a.dpuf

Hodge and Shevlin, 2013; Chen, Greene, and Owers, 2015). In addition, with better reporting quality, Chan, Chen, and Chen (2013) find that banks reduce interest rates, increase loan maturity, and decrease collateral subsequent to clawback adoptions, and Gao, Iskandar-Datta and Jin (2011) find that markets generally react favorably to the adoption.

Beyond the original intent of preventing earnings manipulation, we examine the modifying effects of clawbacks on corporate strategies. In particular, we examine the impact of clawbacks on the level and quality of corporate investment. We first focus on innovation because it is the key element for corporate competitiveness and firm value. Meanwhile, the pursuit of an edge in innovation is inherently uncertain and long term in nature, which is sensitive to executive incentive plans.

According to Edmans, Gabaix and Jenter (2017), incentive contracts always have unintended consequences. Although clawback provisions are intended to restrain corporate managers from committing financial fraud, how would managers alter corporate investment strategies in response to incentive changes in compensation contracts? We have two conjectures: one is a reduced amount of risky investment to avoid triggering the clawback provision; and the other is improved quality of risky investments to achieve better performance. In other words, we hypothesize that managers "dance with shackles on", i.e., maximize risky investment payoffs under additional constraints imposed by the clawback terms.

On the one hand, we predict that clawbacks are likely to limit corporate innovation amounts for two reasons. First, the clawback provisions are usually

triggered by extreme negative corporate events, which weaken managers' risk-taking incentives (Babenko et al., 2017). Furthermore, innovation-related input is one of the riskiest investment decisions. When executives' wealth is contingent on extreme negative corporate events, fewer resources are expected to be allocated to innovation investment, consequently restraining the innovation output level. Second, while clawback provisions effectively discourage managers from accrual management to avoid financial misstatements, real transaction management is used more to boost short-term financial performance (Chan et al., 2015). One approach of real transaction management is to reduce R&D expenditures, which is predicted to result in a lower level of innovation output.

On the other hand, given additional constraints due to clawbacks, it is natural to ask how the quality of output is affected, in addition to the level of output. The literature measures the quality of innovation output by estimating the quality of patents in terms of the exploration of new unproved actions or the exploitation of tested actions. The higher that the level of exploration (exploitation) is, the higher (lower) quality that the patent has. According to Manso (2010), standard pay-for-performance contracts encourage repeated efforts and result in exploitative activities, while contracts that reward long-term success promote explorative investments. Because the usual pay-for-performance contracts that provide ex-ante incentives induce executives to focus on short-term performance rather than long-term value, it is essential to shift executives' incentive horizons from the short term to the long term to increase the quality of innovation output. Edmans, Gabaix and Jenter

(2017) state that clawbacks are one of the remedies for short-termism of executives. Therefore, we predict that clawbacks improve the quality of innovation output.

In investigating the impact of clawback provisions on firms' innovation productivity, we obtain voluntary adoptions of clawback provisions by first crawling the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database using the same strings employed by Babenko et al. (2017) and then manually confirming the meaning of the crawled excerpts.

We use the number of patents and the number of citations, which come from the United States Patent and Trademark Office (USPTO) database and are adjusted following Hall, Jaffe, and Trajtenberg (2001, 2005), to measure innovation output level. We use exploitation and exploration to measure innovation output quality. Following Custodio, Ferreira and Matos (2013), exploitation (exploration) is defined as the number of exploitative (exploratory) patents filed in a given year divided by the number of all patents filed by the firm in the same year; a patent is classified as exploitative (exploratory) if at least 80% of its citations are based on current knowledge.

Using a panel sample of 13,664 observations from 2001 to 2010, we find that firms that have voluntarily adopted clawback provisions have lower innovation productivity. In particular, firms with clawbacks have significantly fewer patents filed and fewer citations in up to three years. For example, the coefficient estimate on *clawback dummy* is -0.081, which is significant at the 1% level, in the ordinary least squares (OLS) regression of *Patent* in three years, indicating that the number of

patents filed decreases by 7.8% after firms impose a clawback provision in their executive compensation contracts. We also examine how firms adjust their R&D investment after clawback adoption and find that firms consistently devote fewer resources to R&D activities in the three years subsequent to the adoption. Regarding innovation quality, consistent with our prediction, we find that the exploration degree of patents increases three years after clawback adoption, while the exploitation degree of patents decreases after clawback adoption.

One endogenous concern is that firms that voluntarily initiate clawbacks can be firms the competitiveness of which relies less on innovation. To control for the potential endogeneity problem, we employ a difference-in-differences (DID) approach by comparing the innovation output of firms with clawbacks and those without clawbacks from the pre- to post-Dodd-Frank periods. Dodd-Frank serves as a good quasi-natural experiment since it mandates the U.S. Securities and Exchange Commission (SEC) to require all public firms to adopt a clawback provision.[3]

We then calculate the propensity score to match firms with clawbacks with firms without clawbacks and conduct DID regression using the paired sample from one year before to one year after Dodd-Frank with the enacting year excluded. We find that firms without clawbacks experience a larger drop in the number of patents, citations, and R&D investment after Dodd-Frank than firms with voluntary clawbacks. In contrast, the exploration degree of firms without clawbacks increases more than that of firms with clawbacks after Dodd-Frank. In conclusion, with clawbacks as an

[3] Although the SEC has not yet implemented the 10D-1 rule on this matter, Dodd-Frank has presumably changed executives' risk-taking incentives because the act is retroactive when implemented.

ex-post governance scheme, executives slow the total amount of resources devoted to innovation investment but care more about the quality of innovation output. As a result, the total output level decreases, while the quality of output increases.

To further our understanding of the effects of clawback provisions, we perform several additional investigations. First, we examine the moderating effect of the original intent of clawbacks on their unintended impact. We find that the negative impact of clawbacks on innovation output level and the positive effect on innovation output quality are more pronounced if firms have a higher probability of restating their financial reports. In other words, the unintended impact is conditional on the likelihood that clawbacks are triggered. When firms display a greater likelihood of financial misstatements, their clawback constraints are more likely to be binding. As a result, we expect to observe a stronger impact of clawbacks on corporate innovation.

Second, it is the boards of public firms that will be required to enforce the recovery of excess payments. Therefore, the extent to which clawbacks impede innovation is also contingent on the quality of internal governance. We find that the decline in innovation activities after mandatory clawbacks is more pronounced among firms with stronger internal governance.

Finally, we employ mergers and acquisitions (M&As) decisions as an alternative setting to investigate the impact of clawbacks on corporate investment. M&As are another type of strategic and long-term investment decision, with significant impacts on shareholder wealth. We find that the number of M&As in the subsequent three years decreases after clawback adoption, while the announcement

returns of the deals after clawback adoption are higher than those of firms without clawbacks. In summary, the results using M&A decisions are consistent with innovation investment in that clawbacks reduce the level of output and, at the same time, increase the quality of investment.

Our study contributes to the literature in several manners. First, we contribute to the executive compensation literature by investigating the impact of penalty schemes on executives' ex-ante incentives and then on corporate strategies. We demonstrate that clawbacks, as one ex-post governance mechanism, play an essential role in improving the binding effects of incentive contracts.

Second, to the best of our knowledge, this paper provides the first systematic examination of the impact of clawbacks on the level and quality of corporate investment from the perspectives of both innovation and M&As. There is one concurrent paper by Babenko et al. (2017) that focuses on the determinants of clawback adoption and also on how clawbacks affect executives' risk-taking incentives using a series of risk measures. One of the measures is the number of patents filed. Our paper is motivated from a different angle and focuses on the impact of clawbacks on corporate investment strategies in specific. We study both the investment output level and output quality at the same time. Investment activities in our study include both innovation and M&As. For example, in addition to patent number and citation as proxies for output amounts, we further use explorative (exploitative) indicator to measure the quality of innovation output. Similarly, M&A frequency is used as the investment amount and post-event cumulative abnormal

returns (CARs) are used as an indirect measure of M&A quality. Our study also contributes to the discussion of the policy suitability of clawbacks. The decreases in the level of investment output are unintended consequences of clawbacks. However, it is not necessary to deny the suitability of clawbacks because, exactly like dancing with shackles on, clawbacks make executives more prudent and lead to increases in investment quality.

Finally, our study complements the previous literature on innovation productivity by showing that clawbacks are an important determinant of R&D investment and innovation output. We find that clawbacks discourage managers from taking risks and hence reduce firms' R&D inputs and patent outputs, while clawbacks weaken mangers' short-termism and consequently improve patent quality.

The paper proceeds as follows. Section I describes the data, variable construction, and summary statistics. In Section II, we discuss our empirical models and results. Section III reports the results of additional analysis. Finally, Section IV summarizes and concludes the paper.

I. Data, Variable Construction, and Summary Characteristics

I.1 Data Sources

I.1.1 Innovation Activities

To examine innovation activities, we use the input to innovation processes, the output level and the output quality of innovation process. The input measure is the yearly R&D expenditures from Compustat. While the measure is intuitive, there are a

few limitations on its use. First, it measures only a specific quantifiable input that is observable. Second, it is subject to accounting discretion, specifically the choice of whether to capitalize it or expense it (Acharya and Subramanian, 2009). Finally, it is less than complete; more than 50% of the observations are missing from Compustat[4].

A proxy for output from innovation is a firm's patenting activity, reflecting the successful use of innovation inputs, both observable and unobservable. Patenting activity has been used extensively in the extant literature (e.g., Acharya and Subramanian, 2009; Aghion, Van Reenen, and Zingales, 2013; Brav, et al., 2014; Kogan, Papanikolaou, Seru, and Stoffman, 2014). We access the NBER patent database as of 2014 to obtain annual patent-level information from 1991 to 2006. The relevant information includes information on the patent assignee (the entity, such as the firm that owns the patent), the number of citations received by the patent, the technology class of the patent, and the patent's application and grant year. Then, we extend the NBER patent database to August 2014 using Google-USPTO patent and citation data.[5]

We construct two measures for a firm's patenting output level. The first is a firm's number of patent applications that are eventually granted in a specific year. Patent application year, rather than grant year, is used because it better represents the timing of innovation (Griliches, Pakes, and Hall, 1988). The second measure, which

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[4] Following the norm in the existing literature, we impute missing values from R&D as zero.

[5] UPSTO database is available at http://www.google.com/googlebooks/uspto.html. To link the assignees with Compustat, we first rely on assignees' external identifiers, mapped out by two databases: the NBER patent database; and recent U.S. innovation data (from 1926-2011) compiled by Kogan, Papanikolaou, Seru, and Stoffman (2014), available at http://faculty.chicagobooth.edu/amit.seru/research/data.html. Then, we manually match the new assignees to Compustat by entity name. We exclude the last few months of our patent sample, which contain observations for fiscal year 2014.

captures a patent's influence, is the total number of citations that a firm receives in the subsequent years. Because innovation activity takes time to occur, we measure these proxies for innovation output level after one, two, and three years.

In addition, we measure the innovation output quality using the degree of exploitation versus exploration of the patents. Following Custodio, Ferreira and Matos (2013), exploitation (exploration) is defined as number of exploitative (exploratory) patents filed in a given year divided by the number of all patents filed by the firm in the same year; a patent is classified as exploitative (exploratory) if at least 80% of its citations are based on current knowledge.[6]

The measures of patenting activity, as established by the extant literature on innovation, suffer from two truncation issues. The first stems from the fact that patents show up in the USPTO database only after the grant date. In fact, the average time lag between a patent application and grant is approximately two years; most patents filed are nevertheless granted within five years. Therefore, some applications filed near the end of our sample period were under review but not yet granted by August 2014. To address this truncation bias, we first estimate the application-grant lag distribution for patents filed and granted between 1998 and 2007, following Hall, Jaffe, and Trajtenberg (2001, 2005).[7] More precisely, we calculate the time interval (in years) between application and grant years for each patent. Defining N_t, the application-grant lag distribution, as the fraction of applications in a specific year that are subsequently granted in t years, we compute the truncation-adjusted patent counts,

[6] We also use the cutoff of 60% as a robustness check, and the results are similar.

[7] The patent count adjustment factors are very similar with a shorter estimation window from 2003 to 2007.

$P_{adjusted}$, as $P_{adjusted} = \frac{P_{unadjusted}}{\sum_{s=0}^{2013-T} N_s}$, where $P_{unadjusted}$ is the unadjusted number of applications at fiscal year T and $2007 \leq T \leq 2013$[8]. The second truncation issue is related to the citation counts, in which a patent continues to receive citations, but what we observe ends by fiscal year 2013. We follow Hall, Jaffe, and Trajtenberg (2001, 2005) to correct for this bias by dividing the observed citation counts by the percentage of predicted lifetime citations empirically observed during the lag interval, based on each technological class to which a patent belongs.[9]

Finally, note that the NBER Patent and Citation database records information at the patent level. Therefore, firm attrition is not an issue. Even if a firm has been acquired or has filed for bankruptcy, citations are properly attributed to a patent and the assignee at the time of application when the patent is subsequently granted.

We use the natural logarithm of the weight-factor adjusted patent count ($Patent_{t+n}$) and citation-lag adjusted citations per patent ($Citation_{t+n}$), as our main measures of innovation output level, and we use the natural logarithm of the exploitative patents count ($Exploitation_{t+n}$) and the exploratory patents ($Exploration_{t+n}$), as our main measures of innovation output quality. The use of natural logarithms is appropriate because of the right-skewed distributions of these measures.[10] Finally, we add one to the actual values in the calculation of the natural logarithm for observations with zero patents, citations, exploitation or exploration to keep these firm-year observations.

8 As an illustration, assuming that, in 2011, a company is granted 3 patents (the unadjusted patent count) and that the adjustment is 0.8, indicating that 80% of all patent applications are subsequently granted within two years (2013 is our sample end), the adjusted patent count will be 3.75 (3/0.8).

9 We use the citation adjustment factor, "hjtwt", which is available in the NBER patent database. The adjustment factors are based on the shape of the citation-lag distribution by technological class.

10 Approximately 63% of our firm-year observations have zero patents, comparable to the 77% reported in Fang, Tian, and Tice (2014) and 73% reported in Tian and Wang (2014), whose samples covered the universe of Compustat firms.

I.1.2 Clawback Provisions

We begin with a sample of publicly traded firms belonging to the *S&P 1500*. Then, we search for terms associated with adoption of a clawback provision in proxy statements, 10-Ks, and 8-Ks available in the SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database (Chen, Greene, and Owers, 2015; Babenko et al., 2017).[11] The keyword searches cover the calendar years from 2001 to 2010. To verify that the keywords refer to a compensation clawback policy, we manually inspect each filing.[12]

Panel A of Table 1 presents information on our clawback sample adopted among the *S&P 1500* firms between 2001 and 2010. There are 1,636 firm-year observations with a clawback policy voluntarily adopted in our sample. The time-series pattern of clawback provisions follows closely that of Babenko et al. (2017). First, clawback provisions are rare prior to 2005. Second, adoptions increase sharply from 2006 onwards plausibly due to the amendment to Regulation S-K, which requires firms to disclose clawback policies on executive compensation. Third, approximately 42% (620) of the *S&P 1500* firms had adopted a clawback policy by 2010.

Panel B of Table 1 shows the number and percentage of firms with and without patents and clawback provision, respectively, by industry. Using the Fama-French 12-industry classifications available at Kenneth French's website, we show that the

[11] The search terms used include clawback.+ *or* claw.+back.+ *or* compensat.+ recover.+ *or* compensat.+recoup.+ *or* recoup.+provision.+ *or* recoup.+polic.+ *or* recoup.+award.+ *or* recover.+award.+.

[12] The search terms could refer to a provision unrelated to compensation, for example, clawback provisions related to lending and franchise agreements. Also, mere mention of clawback provisions does not necessarily imply adoption of the policy but the firm's intention to adopt one or the shareholder's push for the firm to adopt one.

percentage of firms with non-zero patents (clawback provision) in our sample ranges from 5.38% to 69.79% (5.08% to 23.08%).[13] Apparently, the propensity to innovate varies by industry. In fact, the innovation process, from the incubation period to the risks involved, varies substantially by industry. To address this concern, we control for heterogeneity in industries and firms in our regressions. Another observation is that, while the percentage of firms with non-zero patents varies substantially by industry, the percentage of firms with clawback provisions does not. This observation indicates that the decision to adopt a clawback provision is somewhat exogenous to innovation activities, at least at the industry level.

[Insert Table 1 about here]

I.1.3 Control Variables

Following the extant literature on innovation, we control for firm and industry characteristics that might be correlated with a firm's future innovation activity. All of the control variables are measured for firm *i* over fiscal year *t*. The control variables in our baseline regressions include: *Log (Total Asset)*, measured by the natural logarithm of firm's total assets; *Operating ROA*, measured by return-on-assets ratio; *Book Leverage*, measured by total debt-to-total assets; *Tobin's Q*, measured by the total market-to-book value of total assets; *Capex*, measured as capital expenditures scaled by total assets; *R&D*, measured as R&D expenditures scaled by total assets; *Tangibility*, measured as net property, plant, and equipment scaled by total assets; *HHI*,

[13] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

measured as the Herfindahl index, based on market capitalization within the Fama-French 12-industry classifications; *Log(Firm's Age)*, measured as the natural logarithm of one plus the number of years since the firm first appear in *Compustat*; *ROA Volatility*, measured as the standard deviation of return-on-assets over the last three years; and *Sales Growth*, measured as the geometric growth in sales over the previous three years. The squared Herfindahl index is included in our baseline regressions to control for the non-linear effects of product market competition (Aghion et al. (2005)). The detailed variable definitions are available in Appendix A.

I.2 Sample Overview

We merge all of the databases described in the previous sections to form the final sample for this paper. Table 2 describes the main variables used. A firm in our final sample has, on average, 1.03 (1.46) granted patents (citations) per year. Of the firms in our sample, 11.8% have a clawback provision in place, which is comparable to previous studies (e.g., Chen, Greene, and Owers (2015)). On average, our sample firm has total assets of $2.4 billion, an R&D ratio of 3%, tangibility of 26%, ROA of 14%, leverage of 21%, Tobin's Q of 1.9, firm age of 27, capital expenditure of 5% and ROA volatility of 4%.

[Insert Table 2 about here]

II. Clawback Provision and Corporate Innovation: Overview

II.1 OLS Specification

In this section, we examine the relationship between clawback provisions and corporate innovations using firm-year panel data from 2001 to 2010. We estimate the following model:

$$INNOVATION_{t+n} = \alpha + \beta_1 CLAWBACK_{i,t} + \beta' CONTROLS_{i,t} + YEAR_t + FIRM_i + ERROR_{i,t} \quad (1)$$

where *i* indexes firm, *t* indexes time, and *n* is one, two, or three. The dependent variables INNOVATION – *R&D, patent, citations, exploitation* and *exploration* – are proxies for innovation activities. Because innovation takes time, we examine the impact of clawback provisions on a firm's innovation activities in subsequent years. *CLAWBACK*, which indicates whether a firm has a voluntarily adopted clawback policy in place, is measured for firm *i* in fiscal year *t*. *CONTROLS* are firm and industry characteristics that can affect a firm's innovation activities. We control for both year and firm fixed effects, which address time-specific effects and time-invariant omitted firm characteristics, respectively. Following Petersen (2009), standard errors are clustered by firm to address the possible autocorrelation of innovation activities over time, which can inflate the statistical significance.

Table 3 presents the effects of a firm's adoption of clawback policy on its R&D inputs and its patent output levels. First, we examine the number of patents filed that are eventually granted. The coefficient estimates of *CLAWBACK* are consistently negative for patents filed from one to three years ahead, with significant levels ranging from 10%, 5%, and 1%, respectively (columns (1) to (3)). Taking column (3)

as an example, the adoption of clawback policy is associated with a 7.8% decrease.[14] Additionally, consistent with the extant literature, we find that large firms tend to innovate more (e.g., Fang, Tian, and Tice, 2014; Brav et al., 2014). Second, columns (4) to (6) show that *CLAWBACK* is negative and significant on patent citations after one to three years, and the negative effect strengthens over time from -14.3% at one year to -21.7% at three years. Finally, we examine the effect of clawback on a proxy for innovation input, *R&D*. Again, *CLAWBACK* is negative. While the effect is statistically significant, the economic magnitude is nevertheless much smaller, -0.1%, -0.2% and -0.2% decreases for one, two, and three years ahead, respectively. Overall, Table 3 shows that clawback provision hinders firm innovation level, in terms of both input and output.

[Insert Table 3 about here]

In addition, we examine the effect of a firm's adoption of a clawback policy on its patent output quality. We measure the innovation output quality using the degree of exploitation versus exploration of the patents. A higher level of exploitation indicates a lower level of patent quality, while a higher level of exploration indicates a higher level of patent quality.[15] Table 4 shows the results. On the one hand, the coefficient estimates of *CLAWBACK* are negative for exploitative patents filed three years ahead and significant at the 5% level. On the other hand, column (6) shows that *CLAWBACK* is positive and significant for the exploratory patent count after three years. These results indicate that the decreases in patent output level associated with

[14] $e^{-0.081} - e^{0}$= -7.8%

[15] These measures require firms to have at least one patent in a specific year.

the clawback provision mainly come from the reduction in the number of exploitative and low-quality patents, while the number of exploratory patents increases after the firm adopts clawbacks. It is worth noting that it takes a longer time to improve investment quality than to cut the output amount. In summary, clawback provisions improve the quality of innovation output.

[Insert Table 4 about here]

II.2 Quasi-natural experiment

In the previous section, we show the relationship between clawback provision and firm future innovation activities, controlling for firm heterogeneity and for factors that affect innovation. In this section, we employ a quasi-natural experiment related to reforms to compensation clawback policies to test the causal effect of the quasi-exogenous reform on firm innovation. The reform is Section 954 of the Dodd-Frank Act of 2010. The Act mandates the SEC to require all publicly listed firms in the U.S. to impose a clawback policy, which is triggered by accounting restatements, regardless of whether fraud is involved, of their executive compensation schemes.

The reform generates a direct and exogenous shock to the adoption of a clawback policy, but it is unlikely to directly affect innovation. Additionally, we do not expect reverse causality to be a concern such that future innovation affects the adoption of a clawback policy caused by the reform. Therefore, it serves as quasi-natural experiment for our tests.

The use of the reform is not without limitations. Although in 2015 the SEC proposed rule 10D-1 to implement Section 954 of Dodd-Frank, which requires exchanges to delist any firms without clawbacks, the SEC has yet implemented the rule. Again, we argue that ex-ante firms will consider the proposed rule, which is applicable retrospectively, seriously. In fact, many firms proactively adopt a clawback policy on executive pay immediately after the Dodd-Frank Act of 2010 before the SEC guidance; approximately 50% of the *S&P 1500* firms have such a policy in place by 2011, an increase of roughly 10% from 2010 (Babenko et al., 2017). While some firms might choose to wait and see, we argue that the possibility of subsequent forced adoption, the implementation of which applies retrospectively, affects the management's incentives to innovate.

Because the Dodd-Frank Act is a wide-sweeping regulatory reform, in which the clawback provision is only one of many, the counterfactuals, which are firms that do not voluntarily adopt a clawback provision prior to the Dodd-Frank Act, are potentially different from firms that choose to adopt one. This selection issue could hinder our inferences; specifically, the factors that drive non-adoption might also drive innovation activities after the passing of the Dodd-Frank Act. To address this issue, we employ the difference-in-differences (DID) methodology to determine the effect of the mandatory adoption of a clawback provision, as proposed by the Dodd-Frank Act, on firm innovation. More precisely, this methodology compares the innovation activities of the treated firms, which are firms *without* a clawback prior to the Act (but which are forced to adopt one after the Act), to that of the counterfactual

firms, which are firms *with* a voluntary clawback in place prior to the Act but which are otherwise similar, pre- and post-Dodd-Frank Act, which induces an exogenous shock due to the mandatory adoption of a clawback provision. This comparison allows us to attribute any observed effect to the mandatory adoption of a clawback policy. While there is uncertainty over the final implementation of Section 954 of the Dodd-Frank Act of 2010, the Section clearly prescribes the scope and conditions in which a mandatory clawback policy applies.

The DID approach has several advantages. First, it eliminates possible omitted trends correlated with clawback adoption and innovation in both the treated and the counterfactual firms. Second, the DID approach helps us to establish causality as our quasi-natural experiment is around a policy change that causes an exogenous shock, and the Act requires each firm to have a clawback policy in place. Additionally, reverse causality is another issue DID addresses; for example, low R&D and innovation might reduce a firm's earnings variability, in turn increasing the firm's propensity to voluntarily adopt a clawback policy. Despite DID's strengths, DID does not fully remove possible unobservables affecting both the treated and counterfactual firms differentially, which are correlated with innovation activities. Again, it is worth noting that the proposed rule, forced adoption of a clawback policy, has yet to be implemented by the SEC, but the expectation of its subsequent enforcement, the rule about which applies retrospectively, is likely to alter management's incentive to pursue innovation activities.

We construct a treated group and a control group of firms using a propensity

score matching algorithm, which identifies matches between firms with preexisting clawback provisions and firms without the year immediately preceding the Dodd-Frank Act. To do so, we first estimate a logit model based on sample firms prior to the passing of the Dodd-Frank Act on 21 July 2010. The dependent variable is one if the firm-year has voluntarily adopted a clawback prior to the Act and is zero otherwise. The model includes all control variables from the OLS specifications, industry fixed effects, other determinants of clawback adoptions and pre-Dodd-Frank innovation growth variables, which are the growth in the patent count *Patent Growth*, the growth in the count of citations *Citation Growth*, the growth in the count of exploitative patents, and the growth in the count of exploratory patents, respectively.[16] Innovation growth variables are calculated over the three years before Dodd-Frank. The inclusion of innovation growth variables helps to satisfy the parallel trends assumption such that the DID estimator is driven by neither the industry nor firm characteristics.[17] The specification captures much of the variations in the choice variable, the voluntary adoption of a clawback prior to the Dodd-Frank Act, as evidenced by a pseudo-R^2 of 19.0% and a p-value from the χ^2 test of the overall model fit less than 0.001. Then, we use the propensity scores, or estimated probabilities, to perform a nearest-neighbor propensity score matching procedure. Specifically, each firm with a preexisting voluntary clawback provision, which is unaffected by forced

[16] The variables include the delta and vega of executive compensation packages, board size, independent director proportion, the ownership proportion of the largest institutional shareholder, past earnings restatements and past class action lawsuits (Babenko et al. 2017).

[17] Lemmon and Roberts (2010) states that the parallel trends assumption requires the level of outcome variables to be identical neither between the treated and counterfactual firms nor between the two regimes because any distinction is differenced out in the estimation. Instead, this assumption requires similar trends in the outcome variables during the pre-event regime for both the treated and counterfactual firms.

adoption as proposed by the Dodd-Frank Act (our control firms), is matched to a firm without one and with the nearest propensity score (our treated firms). In the instances in which there is more than one possible match, we keep the pair with the smallest propensity score. Our final sample includes 290 unique pairs of matched firms.[18]

[Insert Table 5 about here]

Table 5 presents the DID regression results of R&D and innovation output level around the Dodd-Frank Act, which was passed on 21 July 2010. We keep the matched sample for both treated and counterfactual firms for the period two years before and two years after the Dodd-Frank Act (excluding the year the Act was passed), and we estimate the following model:

$$INNOVATION_{t+n} = \alpha + \beta_1 TREATED_{i,t} + \beta_2 DF_t + \beta' TREATED_{i,t} {*} DF_t + \beta_2 CONTROLS_{i,t} + INDUSTRY_{i,ti,\, t} + ERROR_{i,\, t} \quad (2)$$

where *i* indexes firm, *t* indexes time, and *n* is either one or two. The dependent variables – *patent*, *citations*, *R&D*, *exploitation* and *exploration* – proxy for innovation activities.[19] *TREATED* is an indicator variable that equals one for treated firms, which do not have a preexisting voluntarily adopted clawback provision prior to the Dodd-Frank Act and are forced to enact one as proposed by the Act, and zero for control firms. *DF* indicates the period after the Dodd-Frank Act. *CONTROLS* are

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[18] To examine the validity of our DID estimator, which depends on the parallel trends assumption, we run two diagnostic tests. First, we re-estimate the logit model using the matched sample. The statistical insignificance of the two innovation growth variables implies that the trends in innovation outcomes are similar for both the treated and counterfactual firms before the Dodd-Frank Act. Furthermore, the pseudo-R^2 decreases substantially from 19.0% before to 3.7% after matching, and a χ^2 test for overall model fit indicates that the null hypothesis that all of the coefficient estimates of the independent variables are zero (p-value of 0.969) cannot be rejected. Second, we check the difference between the propensity scores of both the treated and counterfactual firms. The difference is reasonably small. For instance, the 95th percentile distance between the two matched groups' propensity scores is only 0.010. Overall, our diagnostics tests suggest that propensity score matching algorithm does eliminate meaningful observable differences between the two groups.

[19] Because our patent sample ends in 2013, we can only test $Innovation_{t+1}$.using samples from t-2 to t+2. When testing $Innovation_{t+2}$, we use samples from t-1 to t+1.

firm and industry characteristics that can affect a firm's innovation activities. We control for industry fixed effects, which address time-invariant omitted industry characteristics. Standard errors are bootstrapped and clustered by firm (Bertrand, Duflo, and Mullainathan, 2004).[20] We report the regression results estimating Equation (2) in Table 5. The coefficient estimates on DF in columns (1) and (2) show that patent output decreases significantly after the Dodd-Frank Act. Furthermore, TREATED * DF indicates that the patent output of the treated firms decreases by –16.7% (*t+2*) more than the counterfactual firms after the Dodd-Frank Act. Columns (3) and (4) present the effects on citations. On the one hand, the decline after the Dodd-Frank Act persists. On the other hand, the incremental effect on the treated firms over that of the counterfactual firms is -0.038 in *t+1* with a p-value=0.051. Turning to innovation input, columns (5) and (6) show that treated firms lower their R&D expenditures significantly more than counterfactual firms by about -0.1% and -0.3% over *t+1* and *t+2*, respectively. Overall, both the innovation output and input level for the treated firms decrease more than those of the counterfactual firms after the mandated adoption of a firm-level clawback policy, as prescribed in the Dodd-Frank Act.

Table 6 presents the DID regression results of patent quality around the Dodd-Frank Act. The coefficient estimates on TREATED * DF are only significant in column (4) with the dependent variable of exploration in *t+2*, indicating that the exploratory patents of the treated firms increase by 10% more than those of the

[20] The results are qualitatively similar using heteroscedasticity-adjusted and firm-clustered standard errors.

counterfactual firms after the Dodd-Frank Act. According to the OLS regressions, the effect of clawbacks on patent quality becomes significant at *t+3*. Due to the limitations of the sample period, we can only conduct the DID regression until *t+2* at maximum, which could be why the significance of the results is weakened.

[Insert Table 6 about here]

III. Additional Analyses

In this section, we extend our tests to examine the possible channels through which clawback provisions can affect innovation activities, and we also further examine the impact of clawback provisions on M&As as an alternative setting for investment decisions.

III.1 Financial misstatement probability

Our tests are motivated by the binding conditions of clawback provisions. In particular, the binding effects of clawbacks are predicted to be stronger if the firm is more likely to restate its financial reports, and in other words, the clawbacks are more liked to be triggered. In this subsection, we examine whether the impact of clawbacks on patenting activities is conditional on the probability of financial misstatement. We follow Dechow et al. (2011) to construct F-scores as measures of the probability of financial misstatement. Dechow et al. (2011) use the financial misstatement data from the SEC's Accounting and Auditing Enforcement Releases (AAERs). They construct the misstatement likelihood measure *F-SCORE*, using a battery of firm characteristics

in a logistic regression model.[21]

In Table 7, we show the results of the baseline regression of innovation activities with the interaction of a clawback adoption dummy and *F-SCORE* (*CLAWBACK*FSCORE*). Columns (1) to (3) report the moderating effects of the financial misstatement probability on the relationships between clawbacks and patent counts. The coefficient estimates on *CLAWBACK*FSCORE* are consistently negative but are only significant at the 5% level for patent counts in *t+3*, indicating that, if a firm is more likely to misstate its financial reports, the number of patents filed in three years undergoes a greater decrease after the adoption of clawbacks. Next, we turn to the citation measure. The results are reported in columns (4) to (6). Similar to the effect on patent output, the citations drop more for firms with a higher probability of misstatement after the adoption of clawbacks. The coefficients are negative and significant at the 10%, 5% and 5% levels in *t+1*, *t+2* and *t+3*, respectively. Regarding the innovation input, while the coefficient estimates on *CLAWBACK*FSCORE* for R&D expenditures are consistently negative, they are only significant in *t+2* at the 10% level. Finally, columns (10) to (15) show the results for innovation quality. We find that the coefficients on the interactions *CLAWBACK*FSCORE* are significantly negative in the regression of the number of exploitative patents in *t+3*, indicating that the reduction in exploitative patents is mainly from firms with greater likelihood of

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[21] The predicted F-SCORE is calculated using the following model;

$$F-SCORE = -7.893 + 0.79 * (rsst\_acc) + 2.518 * (ch\_rec) + 1.191 * (ch\_inv) + 1.979 * (soft\_assets) + 0.171 * (ch\_cs) - 0.932) * (ch\_roa) + 1.029 * (issue)$$

where rsst_acc is change in non-cash net operating assets, ch_rec is change in receivables, soft_assets is total soft assets, ch_cs is change in cash sales, ch_roa is change in Return on Assets, and issue is indicator variable of whether a firm issues securities in a given year.

misstatement.

[Insert Table 7 about here]

Overall, the results here suggest that, if a firm is more likely to misstate its financial reports, the clawback has a stronger impact on innovation activities because it is more likely to be triggered and, as a result, has stronger effects on the ex-ante incentives of executives.

III.2 M&As

To further examine whether the adoption of clawbacks affects corporate investment, we use M&A decisions as an alternative setting. As one of the most important corporate investment decisions, M&As can have significant effects on the wealth of shareholders. While a successful acquisition of other firms can greatly strengthen the advantages of a firm in an industry, a bad decision will destroy a long-established firm. Moreover, empire building has long been recognized as one important motive driving M&As. In particular, motivated by the compensation incentive that is positively related to firm size, executives tend to grow firm size in the fastest way by acquiring other firms. Such a motive will distort executives' decision-making of M&As. In this subsection, we examine how clawbacks affect the executives' motives for conducting M&As.

Our M&A sample comes from Thomson Financial's Securities Data Company (SDC) Platinum database from 2000 to 2013.[22] We require that the deal value

[22] Because Dodd-Frank, which we use as the exogenous shock that mandates the SEC to require firms to adopt clawbacks, was signed in 2010, and we need the following three years' data to construct M&As measures, we

disclosed in SDC be greater than $1 million and that the acquirer be publicly traded and have stock return and financial data available from CRSP and Compustat, respectively. To examine the impact of clawback adoption on the frequency of M&As, we first calculate the number of M&A deals in the subsequent three years. Moreover, we use the value-weighted cumulative abnormal returns of the acquirer from one day before to one day after the M&A announcements (CAR (-1, +1)) of the deals in the subsequent three years to measure the quality of M&A investment decision. The abnormal return is calculated using the market model, of which the parameter is estimated using two hundred trading days of return data ending 11 days before the merger announcement, and the CRSP value-weighted return is used as a proxy for the market return.

Table 8 presents the results from the OLS regressions of the number of M&As on the clawback dummy. In column (1), we do not include any control variables and only control for the firm and year fixed effects. We find that the coefficient on *CLAWBACK* is negative and significant at the 10% level. Columns (2) and (3) report the regression results with the same control variables and with the industry fixed effects and the firm fixed effects, respectively.[23] Again, we find that the coefficients on CLAWBACK are negative and significant at the 10% and 5% levels in columns (2) and (3), respectively. These results suggest that firms tend to conduct fewer M&As after they adopt clawbacks.

[Insert Table 8 about here]

require that the M&A sample cover from 2001 to 2013.

[23] The control variables are the same with regressions of innovation activities except that we do not control for HHI and HHI2 because we control for the industry fixed effects in the M&As tests.

Regarding the examination of the impacts of clawbacks on the quality of investments, we conduct the regression of the value-weighted CARs (-1, +1) of deals in the subsequent three years on a clawback dummy. Because it is well-accepted that acquirers' stock prices are more likely to increase when the transaction is announced while "hot" (Rosen, 2006), we further control for the annual average CARs (-1, 1) of all of the M&A deals in the regression. As expected, we find that the coefficient estimates on CLAWBACK are consistently positive and significant at the 5%, 1% and 10% levels in columns (1), (2) and (3) of Table 9, respectively, indicating that the quality of M&A decisions is positively correlated with clawbacks.

[Insert Table 9 about here]

In summary, the M&As regression results confirm the innovation activity results in general and support that clawback provisions reduce the investment level while improving the investment quality.

IV. Conclusion

This paper examines whether clawback provisions for executive compensation affect corporate investment. First, we show a strong, negative relation between clawback adoption and the levels of firm inputs and outputs of innovation investment. Second, we use the exploitative and exploratory degree of patents to measure the relative quality of patents and to show that the quality is positively correlated with clawback provisions. Third, we exploit Section 954 of the Dodd-Frank Act, which exogenously imposes a clawback policy on excess executive compensation in the

publicly listed firms in the U.S., and we show that clawback causes the levels of firm innovation input and output to drop and the quality of patent output to increase using the difference-in-differences approach. We further show that the impact of clawbacks on patent activities is stronger among firms with greater probability of financial misstatement and firms with better internal governance. Finally, we use M&As as alternative corporate investment decisions and find consistent results that, after adoption of clawbacks, executives become more prudent and invest more cautiously, leading to better investment quality.

The government regulators and legislators have been pushing hard to impose a clawback policy on executive compensation, with the intention of preventing executives from profiting from corporate misconduct and from taking excessive risks. While such a policy was recently criticized because it can lead to underinvestment, consistent with our finding of reduced investment output, our results regarding the investment quality part lend support for this policy. In summary, the clawback policy is not a one-size-fits-all solution and can exert moderating effects on the incentives embedded in executive compensation contracts.

APPENDIX A: Variable Definition

Variable	Definition	Source
Measurements of Innovation Activities		
Patent $_{t+n}$	Natural logarithm of one plus a firm's total number of patents filed (and eventually granted) in years *t +1*, *t+2*, and *t+3*, respectively	USPTO
Citation $_{t+n}$	Natural logarithm of one plus a firm's total number of citations received on a firm's patents filed (and eventually granted) in years *t +1*, *t+2*, and *t+3*, respectively	USPTO
R&D $_{t+n}$	Natural logarithm of one plus RND, deflated by beginning total assets in years *t+1*, *t+2*, and *t+3*, respectively	Compustat
Exploitation $_{t+n}$	Natural logarithm of one plus a firm's total number of exploitative patents filed in a given year divided by the number of all patents filed by the firm in the same year; a patent is classified as exploitative if at least 80% of its citations are based on current knowledge	USPTO
Exploration $_{t+n}$	Natural logarithm of one plus a firm's total number of exploratory patents filed in a given year divided by the number of all patents filed by the firm in the same year; a patent is classified as exploratory if at least 80% of its citations are based on current knowledge	USPTO
Measurements of Voluntary and Mandatory Clawback Adoptions		
CLAWBACK	Indicator variable for voluntary clawback adoption; equal to one when a firm has voluntarily adopted a compensation clawback policy and zero otherwise	EDGAR
DF	Indicator variable for Section 954 of the Dodd-Frank Act, enacted on 21 July 2010, that requires the SEC to impose a mandatory clawback at the firm level; equals one for the period after the Dodd-Frank Act and zero otherwise	Calendar
TREATED	Indicator variable equals one for treated firms, which do not have a pre-existing clawback provision prior to the Dodd-Frank Act and are forced to enact one as proposed by the Act and zero for the counterfactual firms	EDGAR and Calendar
Measurements of M&A Activities		
Number of M&As$_{t+3}$	The number of mergers and acquisitions (M&As) in the subsequent 3 years	SDC
Value-weighted CARs(-1, +1)	The value-weighted cumulative abnormal returns of the acquirer from one day before to one day after the M&A announcements (CAR (-1, +1)) of the deals in the subsequent three years to measure the quality of M&A investment decisions. The abnormal return is calculated using the market model, of which the parameter is estimated using two hundred trading days of return data ending 11 days before the merger announcement, and the CRSP value-weighted	SDC

	return is used as a proxy for the market return.	

Control Variables

TA	Natural logarithm of total assets	Compustat
OROA	oibdp/at	Compustat
LEV	(dlc + dltt)/at	Compustat
Q	(at - seq + csho * prcc_f)/at	Compustat
RND	xrd/at	Compustat
TANGIBILITY	ppent/at	Compustat
CAPEX	capx/at	Compustat
HHI	Industry Herfindahl Index HHI, derived from a firm's market capitalization within a SIC4 industry	Compustat
HHI^2	The square of HHI	Compustat
FIRMAGE	Logarithm of a firm's age, derived from the year the firm entered Compustat	Compustat
PATG	The geometric growth in the number of patents granted the previous three years	USPTO
CITG	The geometric growth in citations on patents granted the previous three years	USPTO
VOLATILITY	The standard deviation in operating ROA over the previous three years	Compustat
SALEG	The geometric growth in sales over the previous three years	Compustat
PCT_IDIR	The proportion of independent directors on the board of directors	ISS Governance
BOARD SIZE	Logarithm of board size	ISS Governance
INSTMAX	Logarithm of largest institutional holdings	Thomson Reuter's 13F
Delta	The change in the dollar value of the executive's wealth per percentage point change in stock price	ExecComp
Vega	The change in the dollar value of the executive's wealth per 0.01 change in the annualized standard deviation of stock returns	ExecComp
Past earnings restatement	1 if the firm announced earnings restatement in the previous five years for any reason, other than clerical errors, and 0 otherwise	Audit Analytics
Past class action lawsuit	1 if the firm has had a class action lawsuit filed against it in the previous five years, and 0 otherwise	Audit Analytics

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TABLE 1: SAMPLE DISTRIBUTION

This table presents the sample distribution. Panel of A reports the number of firms that voluntarily adopt a clawback provision by year. Panel B shows the number and the percentage of firms with zero patents and clawback provision, respectively, by industry. Industry classification follows the Fama and French 12 industry groups.

Panel A: Clawback Sample

Year	No Clawback	Clawback	% Firms with Clawback	Total
2000	1,088	11	1.00%	1,099
2001	1,158	17	1.45%	1,175
2002	1,185	18	1.50%	1,203
2003	1,188	18	1.49%	1,206
2004	1,253	15	1.18%	1,268
2005	1,239	24	1.90%	1,263
2006	1,203	41	3.30%	1,244
2007	1,094	165	13.11%	1,259
2008	1,027	272	20.94%	1,299
2009	871	457	34.41%	1,328
2010	745	575	43.56%	1,320
Total	12,051	1,613	11.80%	13,664

Panel B: Industry Patent and Clawback Distribution

Industry Name	No Patent	%	With Patent	%	No Clawback	%	With Clawback	%	Number of firms
Consumer Non-Durables	587	65.15%	314	34.85%	771	85.57%	130	14.43%	901
Consumer Durables	113	30.21%	261	69.79%	355	94.92%	19	5.08%	374
Manufacturing	682	36.83%	1,170	63.17%	1,642	88.66%	210	11.34%	1,852
Oil, Gas, and Coal	472	78.28%	131	21.72%	537	89.05%	66	10.95%	603
Chemicals	128	28.57%	320	71.43%	390	87.05%	58	12.95%	448
Business Equipment	921	36.53%	1,600	63.47%	2,310	91.63%	211	8.37%	2,521
Telephone and Television	207	88.46%	27	11.54%	180	76.92%	54	23.08%	234
Utilities	791	94.62%	45	5.38%	723	86.48%	113	13.52%	836
Wholesale, Retail, and Services	1,534	89.03%	189	10.97%	1,550	89.96%	173	10.04%	1,723
Healthcare, Medical Equipment, and Drugs	513	46.89%	581	53.11%	978	89.40%	116	10.60%	1,094
Finance	1,355	95.02%	71	4.98%	1,139	79.87%	287	20.13%	1,426
Others	1,438	87.05%	214	12.95%	1,476	89.35%	176	10.65%	1,652
	8,741	63.97%	4,923	36.03%	12,051	88.20%	1,613	11.80%	13,664

TABLE 2: DESCRIPTIVE STATISTICS

This table presents the summary statistics of our sample. It is based on the sample of S&P 1500 firms from 2001 to 2010. Variable definitions are available in Appendix A.

Name	Obs	Mean	Std. Dev.	P25	Median	P75
Patent	13664	1.03	1.69	0	0	1.69
Citation	13664	1.46	2.43	0	0	2.81
Exploitative	4846	0.15	0.17	0	0.1	0.24
Exploratory	4846	0.39	0.21	0.24	0.41	0.55
TA	13664	7.77	1.64	6.57	7.6	8.82
OROA	13664	0.14	0.1	0.08	0.13	0.18
LEV	13664	0.21	0.17	0.05	0.2	0.32
Q	13664	1.9	1.12	1.17	1.52	2.19
CAPEX	13664	0.05	0.05	0.02	0.03	0.06
RND	13664	0.03	0.04	0	0	0.03
TANGIBILITY	13664	0.26	0.23	0.08	0.19	0.39
FIRMAGE	13664	26.89	16.79	12	21.5	42
HHI	13664	0.03	0.03	0.01	0.02	0.03
HHI2	13664	0	0.01	0	0	0
VOLATILITY	13664	0.04	0.05	0.01	0.02	0.05
SALEG	13664	0.53	0.83	0.08	0.31	0.69

TABLE 3: CLAWBACK AND INNOVATION

This table presents the OLS regression results of the model specification: $INNOVATION_{t+n} = \alpha + \beta_1 CLAWBACK_{i,t} + \beta' CONTROLS_{i,t} + YEAR_t + FIRM_i + ERROR_{i,t}$. The dependent variable $INNOVATION_{t+n}$ is $Patent_{t+n}$ for columns (1) to (3), $Citation_{t+n}$ for columns (4) to (6), and $R\&D_{t+n}$ for columns (7) to (9), where n is either 1,2, or 3. $CLAWBACK_{i,t}$ is an indicator variable equals one if a firm has voluntarily adopted a clawback provision, and zero otherwise. Year fixed effects $YEAR_t$ and firm fixed effects $FIRM_i$ are included in all regressions. Variable definitions of our control variables, $CONTROLS_{i,t}$, are available in Appendix A. Standard errors are corrected for heteroskedasticity and clustered by firm. The sample covers the period between 2001 and 2010. ***, **, and * indicates significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	$Patent_{t+1}$	$Patent_{t+2}$	$Patent_{t+3}$	$Citation_{t+1}$	$Citation_{t+2}$	$Citation_{t+3}$	RND_{t+1}	RND_{t+2}	RND_{t+3}
CLAWBACK	-0.038*	-0.044**	-0.081***	-0.154***	-0.150**	-0.244***	-0.001***	-0.002***	-0.002***
	(0.078)	(0.047)	(0.004)	(0.005)	(0.017)	(0.001)	(0.005)	(0.000)	(0.000)
TA	0.141***	0.129***	0.123***	0.259***	0.209***	0.196***	-0.003***	-0.003***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.010)	(0.000)	(0.001)	(0.001)
OROA	0.124	0.042	-0.076	-0.296	-0.841***	-1.215***	0.004	0.006	-0.000
	(0.180)	(0.665)	(0.486)	(0.113)	(0.000)	(0.000)	(0.281)	(0.124)	(0.919)
LEV	-0.002	-0.030	-0.112	-0.059	-0.080	-0.236	-0.001	0.000	0.002
	(0.980)	(0.682)	(0.181)	(0.722)	(0.688)	(0.315)	(0.534)	(0.976)	(0.422)
Q	0.015	0.024**	0.019	0.062***	0.101***	0.152***	-0.000	-0.000	-0.000
	(0.120)	(0.012)	(0.119)	(0.004)	(0.000)	(0.000)	(0.337)	(0.364)	(0.951)
CAPEX	-0.093	-0.192	-0.511***	-0.754*	-1.205***	-1.607***	0.005	0.007	-0.001
	(0.616)	(0.241)	(0.007)	(0.089)	(0.006)	(0.001)	(0.300)	(0.133)	(0.913)
RND	-0.328	-0.810	-0.726	-0.318	-1.497	-1.876	0.347***	0.208***	0.078***
	(0.574)	(0.191)	(0.325)	(0.792)	(0.282)	(0.252)	(0.000)	(0.000)	(0.010)
TANGIBILITY	0.637***	0.631***	0.646***	1.784***	1.901***	2.155***	0.004	-0.002	-0.003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.190)	(0.590)	(0.351)
FIRMAGE	-0.020	-0.173	-0.356	-0.147	-0.285	-0.342	0.003	0.004	0.005
	(0.872)	(0.354)	(0.174)	(0.677)	(0.543)	(0.494)	(0.358)	(0.347)	(0.180)
HHI	-1.507	-2.233**	-4.491***	-11.829***	-13.687***	-17.609***	-0.022	-0.004	-0.004
	(0.118)	(0.030)	(0.000)	(0.000)	(0.000)	(0.000)	(0.169)	(0.840)	(0.870)
HHI2	3.801	5.838**	11.602***	28.875***	33.651***	43.549***	0.061	0.016	0.017
	(0.137)	(0.033)	(0.000)	(0.000)	(0.000)	(0.000)	(0.160)	(0.762)	(0.767)
VOLATILITY	0.050	0.133	0.482***	1.217***	1.298***	1.833***	-0.011**	-0.018***	-0.019***
	(0.729)	(0.367)	(0.002)	(0.000)	(0.000)	(0.000)	(0.039)	(0.006)	(0.006)
SALEG	-0.016**	-0.016*	-0.023**	-0.046***	-0.044**	-0.061**	0.001**	0.000	-0.000
	(0.036)	(0.061)	(0.027)	(0.010)	(0.029)	(0.011)	(0.046)	(0.709)	(0.871)
Constant	0.310	3.851	8.124	3.106	6.613	8.033	-0.027	-0.040	-0.075
	(0.908)	(0.350)	(0.164)	(0.687)	(0.522)	(0.472)	(0.702)	(0.642)	(0.410)
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	13,664	13,016	12,395	13,664	13,016	12,395	13,664	13,016	12,395
R-squared	0.955	0.954	0.938	0.890	0.867	0.818	0.939	0.933	0.934

TABLE 4: CLAWBACK AND INNOVATION QUALITY

This presents the OLS regression results of the model specification: INNOVATION QUALITY$_{t+n}$ = α + $β_1$CLAWBACK$_{i,t}$ + β'CONTROLS$_{i,t}$ + YEAR$_t$ + FIRM$_i$ + ERROR$_{i,t}$. The dependent variable INNOVATION QUALITY$_{t+n}$ is Exploitation$_{t+n}$ for columns (1) to (3) and Exploration$_{t+n}$ for columns (4) to (6), where n is either 1,2, or 3. CLAWBACK$_{i,t}$ is an indicator variable equals one if a firm has voluntarily adopted a clawback provision, and zero otherwise. Year fixed effects YEAR$_t$ and firm fixed effects FIRM$_i$ are included in all regressions. Variable definitions of our control variables, CONTROLS$_{i,t}$, are available in Appendix A. Standard errors are corrected for heteroskedasticity and clustered by firm. The sample covers the period between 2001 and 2010. ***, **, and * indicates significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Exploitation$_{t+1}$	Exploitation$_{t+2}$	Exploitation$_{t+3}$	Exploration$_{t+1}$	Exploration$_{t+2}$	Exploration$_{t+3}$
CLAWBACK	0.001	-0.008	-0.027**	0.000	0.006	0.033**
	(0.917)	(0.486)	(0.040)	(0.984)	(0.630)	(0.025)
TA	0.015	0.006	-0.007	-0.006	-0.006	-0.005
	(0.149)	(0.610)	(0.612)	(0.671)	(0.667)	(0.745)
OROA	-0.006	-0.071	-0.085	0.098	0.083	0.100
	(0.900)	(0.131)	(0.172)	(0.100)	(0.174)	(0.114)
LEV	-0.018	-0.079**	-0.126***	0.047	0.046	0.093**
	(0.553)	(0.020)	(0.001)	(0.199)	(0.217)	(0.015)
Q	0.002	0.005	0.003	-0.005	-0.009**	-0.003
	(0.651)	(0.148)	(0.413)	(0.180)	(0.030)	(0.523)
CAPEX	0.040	-0.077	-0.038	-0.182	0.003	-0.144
	(0.776)	(0.631)	(0.826)	(0.292)	(0.986)	(0.467)
RND	-0.039	-0.189	-0.354**	0.244	0.147	0.222
	(0.766)	(0.178)	(0.039)	(0.123)	(0.378)	(0.211)
TANGIBILITY	0.060	0.065	0.106	-0.115	-0.052	0.026
	(0.404)	(0.418)	(0.232)	(0.210)	(0.627)	(0.828)
FIRMAGE	-0.027	-0.030	-0.123***	-0.047	-0.152**	0.013
	(0.564)	(0.508)	(0.001)	(0.485)	(0.019)	(0.850)
HHI	0.395	0.410	-0.465	0.039	0.392	0.655
	(0.448)	(0.458)	(0.391)	(0.941)	(0.532)	(0.316)
HHI2	-0.804	-1.252	1.166	-0.341	-0.788	-1.196
	(0.608)	(0.416)	(0.444)	(0.830)	(0.662)	(0.538)
VOLATILITY	-0.054	-0.020	-0.056	0.021	0.072	0.080
	(0.381)	(0.764)	(0.410)	(0.788)	(0.334)	(0.270)
SALEG	-0.008**	-0.001	0.005	0.010*	0.002	-0.004
	(0.029)	(0.779)	(0.292)	(0.056)	(0.599)	(0.471)
Constant	0.657	0.848	3.407***	1.664	4.325***	0.036
	(0.586)	(0.474)	(0.001)	(0.332)	(0.010)	(0.985)
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	4,846	4,533	4,131	4,846	4,533	4,131
R-squared	0.450	0.462	0.470	0.430	0.438	0.447

TABLE 5: DIFFERENCE-IN-DIFFERENCE TEST ON INNOVATION

This table presents the DID test results of the model specification: $INNOVATION_{t+n} = \alpha + \beta_1 TREATED_{i,t} + \beta_2 DF_t + \beta_3 TREATED_{i,t} * DF_t + \beta' CONTORLS_{i,t} + INDUSTRY_{i,t} + ERROR_{i,t}$. The dependent variable $INNOVATION_{t+n}$ is $Patent_{t+n}$ for columns (1) to (2), $Citation_{t+n}$ for columns (3) to (4), and $R\&D_{t+n}$ for columns (5) to (6), where n is either 1 or 2. $TREATED_{i,t}$ is an indicator variable equals one for treated firms, and zero for counterfactual firms. DF_t is an indicator variable equals one for the period after the Dodd-Frank Act, and zero otherwise. Sample selection begins with all firms prior to the Dodd-Frank Act. The treated firms are those without a pre-existing clawback provision, but are required to adopt one as proposed by the Act, while the counterfactual firms are those with a pre-existing clawback provision prior to the Dodd-Frank Act. Firms are matched one-to-one based on the nearest propensity score matching. Standard errors are bootstrapped and clustered by firm. Patent data are from UPSTO. ***, **, and * indicates significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	$Patent_{t+1}$	$Patent_{t+2}$	$Citation_{t+1}$	$Citation_{t+2}$	RND_{t+1}	RND_{t+2}
TREATED*DF	-0.082	-0.183**	-0.338*	-0.333	-0.001*	-0.003*
	(0.292)	(0.047)	(0.051)	(0.271)	(0.058)	(0.070)
TREATED	0.086	0.132	0.144	0.133	0.001**	0.003**
	(0.656)	(0.458)	(0.387)	(0.570)	(0.038)	(0.021)
DF	-0.373***	-0.504***	-1.246***	-1.262***	0.001***	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.557)
TA	0.413***	0.395***	0.315***	0.246***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.664)	(0.591)
OROA	2.757**	2.869*	2.550**	-0.185	-0.011	-0.005
	(0.014)	(0.057)	(0.015)	(0.897)	(0.355)	(0.464)
LEV	0.062	0.157	-0.211	-0.413	-0.000	0.001
	(0.889)	(0.690)	(0.615)	(0.412)	(0.834)	(0.735)
Q	0.018	0.021	-0.134	0.074	0.000	0.000
	(0.869)	(0.892)	(0.176)	(0.545)	(0.726)	(0.738)
CAPEX	-1.325	0.291	1.537	2.817	-0.001	0.005
	(0.438)	(0.895)	(0.523)	(0.287)	(0.868)	(0.627)
RND	14.906***	15.724***	15.371***	9.270***	0.845***	0.906***
	(0.000)	(0.000)	(0.000)	(0.006)	(0.000)	(0.000)
TANGIBILITY	-0.460	-0.397	-0.368	-0.244	-0.003	-0.001
	(0.334)	(0.393)	(0.414)	(0.561)	(0.175)	(0.468)
FIRMAGE	0.018***	0.017***	0.011**	0.007	0.000	0.000**
	(0.001)	(0.005)	(0.011)	(0.138)	(0.819)	(0.046)
HHI	-30.642***	-167.972***	-159.734***	-439.131***	0.157**	-0.373
	(0.005)	(0.000)	(0.000)	(0.000)	(0.027)	(0.241)
HHI2	267.498***	2,328.519***	1,267.377***	4,658.360***	-1.162**	-1.857
	(0.003)	(0.006)	(0.000)	(0.000)	(0.017)	(0.607)
VOLATILITY	-0.999	-0.261	-2.038	-0.393	0.011**	0.021*
	(0.547)	(0.889)	(0.129)	(0.806)	(0.042)	(0.072)
SALEG	-0.039	-0.097	-0.108	-0.323	-0.000	-0.002
	(0.737)	(0.385)	(0.527)	(0.228)	(0.744)	(0.246)
Constant	-3.237***	-1.099	1.632**	7.643***	-0.003	0.012
	(0.000)	(0.176)	(0.012)	(0.000)	(0.213)	(0.162)
Industry FE	YES	YES	YES	YES	YES	YES
Observations	2,227	1,083	2,245	1,096	2,576	1,272
R-squared	0.573	0.556	0.473	0.411	0.945	0.961

TABLE 6: DIFFERENCE-IN-DIFFERENCE TEST ON INNOVATION QUALITY

This table presents the DID test results of the model specification: INNOVATION $QUALITY_{t+n} = \alpha + \beta_1 TREATED_{i,t} + \beta_2 DF_t + \beta_3 TREATED_{i,t}*DF_t + \beta' CONTORLS_{i,t} + INDUSTRY_{i,t} + ERROR_{i,t}$. The dependent variable INNOVATION $QUALITY_{t+n}$ is $Exploitation_{t+n}$ for columns (1) to (2) and $Exploration_{t+n}$ for columns (3) to (4), where n is either 1 or 2. $TREATED_{i,t}$ is an indicator variable equals one for treated firms, and zero for counterfactual firms. DF_t is an indicator variable equals one for the period after the Dodd-Frank Act, and zero otherwise. Sample selection begins with all firms prior to the Dodd-Frank Act. The treated firms are those without a pre-existing clawback provision, but are required to adopt one as proposed by the Act, while the counterfactual firms are those with a pre-existing clawback provision prior to the Dodd-Frank Act. Firms are matched one-to-one based on the nearest propensity score matching. Standard errors are bootstrapped and clustered by firm. Patent data are from UPSTO. ***, **, and * indicates significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)
	$Exploitation_{t+1}$	$Exploitation_{t+2}$	$Exploration_{t+1}$	$Exploration_{t+2}$
TREATED*DF	0.049	-0.016	-0.031	0.104*
	(0.253)	(0.755)	(0.418)	(0.082)
TREATED	-0.039	0.037	0.048	-0.052
	(0.180)	(0.486)	(0.123)	(0.219)
DF	0.099***	0.049	-0.087***	-0.083**
	(0.000)	(0.170)	(0.001)	(0.035)
TA	0.020*	0.039***	-0.015	-0.016
	(0.077)	(0.002)	(0.257)	(0.321)
OROA	-0.449**	-0.283	0.218	-0.084
	(0.038)	(0.493)	(0.373)	(0.831)
LEV	0.082	-0.052	-0.042	-0.132
	(0.379)	(0.709)	(0.698)	(0.325)
Q	0.076***	0.060	-0.047	-0.043
	(0.009)	(0.262)	(0.154)	(0.458)
CAPEX	-0.037	1.028	0.392	0.707
	(0.943)	(0.331)	(0.541)	(0.511)
RND	-0.406	-0.394	0.262	0.319
	(0.242)	(0.489)	(0.547)	(0.599)
TANGIBILITY	0.106	-0.022	-0.023	-0.101
	(0.439)	(0.910)	(0.891)	(0.696)
FIRMAGE	-0.002**	-0.002**	0.001	0.002
	(0.017)	(0.044)	(0.189)	(0.268)
HHI	-6.612**	13.229	-2.977	-36.837
	(0.045)	(0.520)	(0.509)	(0.159)
HHI2	38.168	-233.458	25.515	409.162
	(0.111)	(0.391)	(0.422)	(0.221)
VOLATILITY	0.161	0.234	-0.534	-0.798
	(0.611)	(0.718)	(0.207)	(0.269)
SALEG	0.053**	0.017	-0.062**	-0.093
	(0.037)	(0.755)	(0.036)	(0.189)
Constant	0.120	-0.314	0.575***	1.296**
	(0.479)	(0.473)	(0.002)	(0.014)
Industry FE	YES	YES	YES	YES
Observations	615	280	615	280
R-squared	0.286	0.238	0.129	0.060

TABLE 7: FINANCIAL MISSTATEMENT PROBABILITY

This table presents the moderating effect of financial misstatement probability on the impact of clawback provisions on the innovation output level and quality. The model specification is $INNOVATION_{t+n} = \alpha + \beta_1 CLAWBACK_{i,t} * FSCORE_{i,t} + \beta_2 FSCORE_{i,t} + \beta_3 CLAWBACK_{i,t} + \beta' CONTROLS_{i,t} + YEAR_t + FIRM_i + ERROR_{i,t}$. The dependent variable $INNOVATION_{t+n}$ is $Patent_{t+n}$ for columns (1) to (3), $Citation_{t+n}$ for columns (4) to (6), $R\&D_{t+n}$ for columns (7) to (9), $Exploitation_{t+n}$ for columns (10) to (12) and $Exploration_{t+n}$ for columns (13) to (15) , where n is either 1,2, or 3. $CLAWBACK_{i,t}$ is an indicator variable equals one if a firm has voluntarily adopted a clawback provision, and zero otherwise. $FSCORE_{i,t}$ is the predicted likelihood of misstatement proposed by Dechow et al. (2011). Year fixed effects $YEAR_t$ and firm fixed effects $FIRM_i$ are included in all regressions. Variable definitions of our control variables, $CONTROLS_{i,t}$, are available in Appendix A. Standard errors are corrected for heteroskedasticity and clustered by firm. ***, **, and * indicates significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) $Patent_{t+1}$	(2) $Patent_{t+2}$	(3) $Patent_{t+3}$	(4) $Citation_{t+1}$	(5) $Citation_{t+2}$	(6) $Citation_{t+3}$	(7) RND_{t+1}	(8) RND_{t+2}	(9) RND_{t+3}	(10) $Exploitation_{t+1}$	(11) $Exploitation_{t+2}$	(12) $Exploitation_{t+3}$	(13) $Exploration_{t+1}$	(14) $Exploration_{t+2}$	E
CLAWBACK * FSCORE	-0.015	-0.054	-0.128**	-0.194*	-0.292**	-0.355**	-0.000	-0.002*	-0.001	0.025	-0.005	-0.044*	-0.015	-0.005	
	(0.687)	(0.212)	(0.033)	(0.061)	(0.023)	(0.027)	(0.758)	(0.067)	(0.107)	(0.357)	(0.855)	(0.098)	(0.599)	(0.858)	
FSCORE	-0.002	-0.002	-0.001**	-0.006	-0.003***	-0.001	0.000	0.000	0.000	-0.002	-0.000*	-0.000	0.000	0.001***	0
	(0.234)	(0.172)	(0.016)	(0.137)	(0.000)	(0.540)	(0.326)	(0.357)	(0.270)	(0.775)	(0.053)	(0.241)	(0.961)	(0.000)	
CLAWBACK	-0.051	-0.029	-0.009	-0.048	0.059	-0.006	-0.001	-0.001	-0.001	-0.032	-0.005	0.010	0.025	0.009	
	(0.256)	(0.545)	(0.886)	(0.673)	(0.663)	(0.970)	(0.215)	(0.463)	(0.260)	(0.273)	(0.869)	(0.738)	(0.456)	(0.781)	
TA	0.161***	0.151***	0.156***	0.298***	0.231***	0.230**	-0.003***	-0.003***	-0.003***	0.024*	0.010	-0.007	-0.008	-0.007	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.010)	(0.000)	(0.006)	(0.009)	(0.060)	(0.464)	(0.681)	(0.606)	(0.657)	
OROA	0.179	0.099	-0.060	-0.170	-0.662***	-1.064***	0.006	0.007	0.003	-0.013	-0.065	-0.076	0.106*	0.074	
	(0.105)	(0.369)	(0.643)	(0.431)	(0.008)	(0.001)	(0.192)	(0.153)	(0.548)	(0.793)	(0.182)	(0.265)	(0.082)	(0.257)	
LEV	-0.036	-0.045	-0.099	-0.074	-0.064	-0.242	-0.003	-0.000	0.002	-0.029	-0.091**	-0.133***	0.020	0.048	0
	(0.666)	(0.593)	(0.307)	(0.699)	(0.779)	(0.369)	(0.318)	(0.924)	(0.558)	(0.383)	(0.011)	(0.000)	(0.611)	(0.226)	
Q	0.018	0.024**	0.020	0.060***	0.085***	0.130***	-0.001	-0.001*	-0.000	0.000	0.004	0.003	-0.005	-0.004	
	(0.111)	(0.027)	(0.147)	(0.009)	(0.002)	(0.000)	(0.206)	(0.080)	(0.448)	(0.900)	(0.368)	(0.578)	(0.218)	(0.340)	
CAPEX	-0.208	-0.175	-0.471**	-0.839*	-1.045**	-1.337**	0.004	0.010*	0.000	0.040	-0.067	-0.033	-0.134	-0.095	
	(0.299)	(0.311)	(0.026)	(0.059)	(0.023)	(0.014)	(0.407)	(0.073)	(0.972)	(0.790)	(0.709)	(0.834)	(0.489)	(0.619)	
RND	-0.415	-0.842	-0.494	-0.581	-1.943	-2.287	0.336***	0.209***	0.065**	0.020	-0.204	-0.416**	0.288*	0.168	
	(0.512)	(0.201)	(0.518)	(0.655)	(0.188)	(0.179)	(0.000)	(0.000)	(0.044)	(0.883)	(0.162)	(0.023)	(0.083)	(0.327)	
TANGIBILITY	0.714***	0.656***	0.585***	1.782***	1.751***	1.884***	0.005	-0.003	-0.003	0.079	0.091	0.110	-0.160	-0.082	

	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.160)	(0.483)	(0.427)	(0.302)	(0.312)	(0.275)	(0.142)	(0.511)
FIRMAGE	0.054	-0.092	-0.421	-0.024	-0.101	-0.238	0.005	0.002	0.005	-0.021	-0.038	-0.085***	-0.065	-0.140*
	(0.754)	(0.725)	(0.288)	(0.957)	(0.873)	(0.723)	(0.376)	(0.579)	(0.349)	(0.643)	(0.475)	(0.001)	(0.270)	(0.057)
HHI	-1.621	-3.119***	-5.344***	-11.748***	-14.853***	-18.818***	-0.020	-0.001	-0.008	0.196	0.478	-0.860	-0.093	0.576
	(0.148)	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)	(0.318)	(0.970)	(0.777)	(0.740)	(0.461)	(0.193)	(0.881)	(0.427)
HHI2	4.050	8.233***	13.886***	28.355***	36.875***	46.940***	0.054	0.009	0.028	-0.116	-1.462	2.515	-0.098	-1.446
	(0.171)	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)	(0.304)	(0.888)	(0.703)	(0.949)	(0.418)	(0.168)	(0.958)	(0.484)
VOLATILITY	0.037	0.141	0.412**	1.147***	1.390***	1.843***	-0.009	-0.019***	-0.021**	-0.076	-0.025	-0.020	0.092	0.048
	(0.822)	(0.399)	(0.019)	(0.002)	(0.001)	(0.000)	(0.139)	(0.006)	(0.010)	(0.240)	(0.725)	(0.791)	(0.265)	(0.534)
SALEG	-0.019**	-0.021*	-0.025*	-0.058***	-0.047**	-0.069**	0.001*	0.000	0.000	-0.007*	-0.001	0.002	0.008	0.003
	(0.040)	(0.059)	(0.057)	(0.004)	(0.050)	(0.017)	(0.096)	(0.562)	(0.687)	(0.069)	(0.910)	(0.726)	(0.150)	(0.555)
Constant	-1.337	2.007	9.431	0.329	2.618	5.711	-0.059	-0.011	-0.066	0.428	1.000	2.351***	2.087	3.895**
	(0.722)	(0.726)	(0.284)	(0.973)	(0.850)	(0.702)	(0.602)	(0.915)	(0.594)	(0.701)	(0.456)	(0.001)	(0.153)	(0.033)
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	10,388	9,910	9,436	10,388	9,910	9,436	10,388	9,910	9,436	3,986	3,734	3,405	3,986	3,734
Adjusted R-squared	0.952	0.952	0.936	0.890	0.867	0.823	0.937	0.931	0.933	0.452	0.462	0.473	0.431	0.448

TABLE 8: CLAWBACK AND FREQUENCY OF MERGERS AND ACQUISITIONS

This table presents the OLS regression results of the model specification: Number of $M\&As_{t+3} = \alpha + \beta_1 CLAWBACK_{i,t} + \beta' CONTROLS_{i,t} + YEAR_t + IND_i/FIRM_i + ERROR_{i,t}$. The dependent variable Number of $M\&As_{t+3}$ is the number of mergers and acquisitions (M&As) in the following 3 years. $CLAWBACK_{i,t}$ is an indicator variable equals one if a firm has voluntarily adopted a clawback provision, and zero otherwise. Variable definitions of our control variables, $CONTROLS_{i,t}$, are available in Appendix A. Standard errors are corrected for heteroskedasticity and clustered by firm. ***, **, and * indicates significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) Number of M&As	(2) Number of M&As	(3) Number of M&As
CLAWBACK	-0.108*	-0.111*	-0.133**
	(0.066)	(0.051)	(0.027)
TA		0.185***	-0.433***
		(0.000)	(0.000)
OROA		0.846***	1.008***
		(0.001)	(0.000)
LEV		-0.314**	-1.028***
		(0.040)	(0.000)
Q		0.035	-0.018
		(0.141)	(0.449)
CAPEX		0.145	-0.798**
		(0.762)	(0.035)
RND		-0.139	-2.546**
		(0.859)	(0.026)
TANGIBILITY		-0.791***	0.267
		(0.000)	(0.433)
VOLATILITY		-0.490	1.081**
		(0.323)	(0.015)
SALEG		0.100***	-0.005
		(0.000)	(0.829)
Constant	1.102***	-0.424*	4.405***
	(0.000)	(0.088)	(0.000)
Firm FE	YES		YES
Year FE	YES	YES	YES
Industry FE		YES	
Observations	14,936	13,877	13,877
Adjusted R-squared	0.581	0.098	0.597

TABLE 9: CLAWBACK AND ANNOUNCEMENT RETURNS OF MERGERS AND ACQUISITIONS

This table presents the OLS regression results of the model specification: $CAR_{i,t+3} = \alpha + \beta_1 CLAWBACK_{i,t} + \beta' CONTROLS_{i,t} + IND_i/FIRM_i + ERROR_{i,t}$. The dependent variable $CAR_{i,t+3}$ is the value-weighted cumulative abnormal return over window (-1, +1) in the following 3 years. $CLAWBACK_{i,t}$ is an indicator variable equals one if a firm has voluntarily adopted a clawback provision, and zero otherwise. Variable definitions of our control variables, $CONTROLS_{i,t}$, are available in Appendix A. Standard errors are corrected for heteroskedasticity and clustered by firm. ***, **, and * indicates significance at 1%, 5%, and 10%, respectively.

VARIABLES	(1) Value-weighted CARs(-1, +1)	(2) Value-weighted CARs(-1, +1)	(3) Value-weighted CARs(-1, +1)
CLAWBACK	0.562**	0.753***	0.603*
	(0.025)	(0.003)	(0.091)
TA		-0.435***	-0.087
		(0.000)	(0.915)
OROA		-3.294	-6.258*
		(0.191)	(0.094)
LEV		-0.274	-2.048
		(0.687)	(0.178)
Q		-0.217**	-0.064
		(0.039)	(0.606)
CAPEX		1.771	-2.029
		(0.575)	(0.579)
RND		-11.864***	-6.508
		(0.002)	(0.444)
TANGIBILITY		1.153	1.650
		(0.233)	(0.761)
VOLATILITY		-2.629	-4.237
		(0.293)	(0.255)
SALEG		0.069	0.103
		(0.698)	(0.559)
ANNUALCAR		-0.432	-0.172
		(0.340)	(0.447)
Constant	0.494***	5.298***	2.813
	(0.000)	(0.001)	(0.729)
Firm FE	YES		YES
Industry FE		YES	
Observations	7,872	7,108	7,108
Adjusted R-squared	0.419	0.019	0.418