Abstract

Clawback provisions allow shareholders to recover previously-awarded compensation from managers involved in earnings manipulation or misconduct. I develop a theory to rationalize clawback adoption and to evaluate its impact on manipulation and the structure of managerial compensation. The theory features a principal-agent model in which effort and manipulation incentives are in conflict. Clawback adoption is more valuable when agency costs are high and also when detection and enforcement structures are more effective. I show that clawbacks reduce the manipulation incentives from short-term compensation, but the possibility of a limited recovery can increase the size of deferred incentives after the adoption. I provide empirical evidence for US public firms in the 2002-2016 period consistent with three implications of the model. First, I document that the wealth-performance sensitivity of vested compensation is higher when executives display a higher record of past earnings manipulation. Second, firm size, director independence and peer firms’ adoption are the main determinants of clawback adoption. Third, using an instrumental variables strategy, I find that clawbacks reduce the intensity of manipulation, but the reduction is smaller for firms with higher pre-adoption reliance on short-term incentives. These firms increase the wealth-performance sensitivity of unvested compensation, which suggests the relevance of enforcement frictions.

JEL codes: D86, G34, J33
Keywords: Clawback, Executives, Governance, Compensation, Accounting Manipulation
1 Introduction

In September 2016 directors at Wells Fargo triggered a clawback provision that recovered $69 million of compensation from then CEO John G. Stumpf, which amounted to four times his annual pay. As internal investigations found out, Mr. Stumpf supported the incentive schemes that propelled fraudulent behavior at the bank’s retail division. This example illustrates that clawback provisions— or simply “clawbacks”— enable shareholders to recover compensation from managers in cases of manipulation of performance metrics or misconduct. Once a rare governance tool, clawbacks are present in 85% of US public firms as of 2016. The events at Wells Fargo highlight that, while managers must return sizable amounts, the threat of recovery may be ineffective to curb manipulation. In this paper I shed light on how limited are the “claws” of clawbacks.

This paper explains the rationale for clawback adoption and assesses its effects on accounting manipulation and executive compensation. For this purpose, I develop a principal-agent model in which shareholders can induce a risk-neutral manager to exert unobservable effort that enhances long-term cash flows. Shareholders can offer short-term compensation based on earnings announcements and satisfy the manager’s preferences for early compensation. The manager, however, can manipulate earnings, which reduces its informativeness and increases the cost of short-term incentive compensation. Hence, shareholders can defer compensation and use clawback provisions to alleviate the manipulation problem.

To better understand the underlying trade-offs, I first consider the contract configurations in the absence of clawbacks. The optimal contract has one of two potential configurations. The first is a short-term compensation contract that induces manipulation and requires shareholders to pay high and frequent bonuses in order to induce effort. The second, meanwhile, is a partly-deferred compensation contract that deters manipulation but carries a cost due to the manager’s impatience. Shareholders then choose the cheaper between a contract that grants manipulation rents to the manager and another contract that involves costly deferrals.

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1 See “Wells Fargo chief to forfeit more than $40m in pay”, Financial Times, September 28, 2016, and “Wells Fargo claws back $75m in bonuses over sham accounts”, Financial Times, April 10, 2017.

2 In Appendix A I report the evolution of clawback adoption across US firms and describe the institutional setting underlying the process of generalized clawback adoption.
In this setup, the introduction of a clawback plays two roles. First, a clawback reduces the manager’s rewards from manipulation, which increases earnings informativeness and lowers the cost of inducing effort through short-term compensation. Second, a clawback allows shareholders to recover the unduly-granted pay and reduce the size of managerial manipulation rents. While these effects provide an unambiguous advantage to clawback contracts, in reality clawback adoption entails frictions related to its enforcement and litigation. Thus, the optimal clawback adoption decision trades off the savings in compensation costs with the costs of clawback enforcement.

The main contribution of this paper lies in analyzing the effects of clawbacks on accounting manipulation and the time structure of incentive compensation. In most of the existing literature contracts with contingent deferred compensation are assimilated to “clawback contracts”—see, e.g. Marinovic and Varas (2017), Makarov and Plantin (2015), Edmans et al. (2012) and Levine and Smith (2009). In contrast, I explicitly relax the managerial limited liability within the legal limits of a clawback, which allows shareholders to provide short-term incentives at a lower cost. Nonetheless, I show that enforcement frictions can lead shareholders to backload compensation, i.e. defer a greater amount of compensation. While Thanassouliis and Tanaka (2017), Chen et al. (2014) and Levine and Smith (2009) make similar assumptions, they disregard the effects of relaxing limited liability with enforcement frictions on the optimal time structure of compensation.

The implications of the model rest on three key assumptions. The first assumption is that manipulation distorts the informativeness of earnings and makes short-term incentive compensation more expensive. This is similar to the models of Crocker and Slemrod (2007) and Goldman and Slezak (2006). However, they leave aside the analysis of clawback adoption or deferred compensation.

The second assumption, which is common to the dynamic agency literature, is that the manager is relatively impatient. As a consequence, deferred compensation is costly for shareholders— as in, e.g., Biais et al. (2007), DeMarzo and Sannikov (2006). Managerial impatience captures the private investment opportunities of the manager or— as I explicitly derive in an extension— the advantage of short-term compensation in reducing the managerial retention costs for shareholders.\(^3\)

The third assumption is that clawback enforcement is subject to frictions: recovery may be costly and incomplete. The frictions may stem from the need to set up the

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\(^3\)In particular, I show this in a signal-jamming model where shareholders must retain the manager after the possibly manipulated earnings announcement. Manipulation reduces the outsiders’ willingness to pay for the manager and the retention costs for shareholders, which makes short-term compensation relatively advantageous.
governance, legal or accounting structures that minimize litigation with the manager and maximize recovery after the clawback trigger. This captures the idea that powerful managers may resist against earnings restatements or against recognizing misconduct (Pyzoha, 2015). Alternatively, the enforcement frictions may also represent optimal governance structures that protect the manager from an opportunistic ex-post use of clawbacks, which would interfere with the ex-ante provision of incentives to managers.

Despite its stylized structure, the model generates a rich set of implications across three dimensions. First, the performance sensitivity of short-term compensation is higher when the optimal contract induces earnings manipulation. In particular, the model predicts that short-term compensation and manipulation are more likely for more impatient managers working in firms with weaker ex-ante monitoring.

Second, the model points to the degree of agency problems and the strength of ex-post detection and enforcement structures as the most relevant determinants of clawback adoption. Thus, firm size, associated with harsher agency problems (Gayle et al., 2015), and director independence, associated with stronger enforcement, represent two candidate predictors of clawback adoption.

Third, the model predicts that clawback adopters increase the performance sensitivity of short-term compensation when they use partly-deferred compensation before adoption. In contrast, the performance sensitivity of short-term compensation decreases for firms in which short-term incentives are more important before adoption. More specifically, these firms may switch to a partly-deferred compensation contract after the adoption, which represents a second-best alternative against a short-term compensation clawback contract that has little effectiveness at curbing the manipulation incentives.

I provide empirical evidence about the implications of the theory using data on clawback adoption, executive compensation and earnings forecasts in public US firms for the 2002-2016 period. First, I find that executives face steeper short-term incentives, measured by the wealth-performance sensitivity of vested compensation when executives systematically announce earnings close to the analysts’ forecasts, which I consider as a proxy for earnings manipulation (Dechow et al., 2010). Second, using information on clawback adoption from proxy statements I find that firm size, board independence and peer adoption represent the most relevant determinants of clawback adoption. This suggests that, consistent with the theoretical arguments, clawbacks are valuable for firms with severe agency problems but strong enforcement structures, and that peer effects are important.
Lastly, I estimate the effects of clawback adoption on accounting manipulation and incentive compensation. To alleviate the endogeneity of clawback adoption, I use an instrumental variables strategy that exploits the strength of peer effects and the cross-industry variation in the share of clawback adopters. Specifically, I take advantage of the increased popularity of clawback provisions among US firms that results from a series of regulatory reforms that since the early 2000s—in particular the 2010 Dodd-Frank Act—reduced the clawback enforcement frictions. Importantly, this trend occurs after “soft” comply-or-explain recommendations, rather than a “hard” compulsory adoption rule. The voluntary nature of adoption allows to exploit the cross-industry heterogeneity as exogenous variation to identify the structural relationship between clawbacks, accounting manipulation and compensation structures.

The estimations suggest that clawback adoption reduces earnings manipulation, proxied by forecasts-meeting behavior and the frequency of financial restatements, but the effect is heterogeneous across the pre-adoption importance of short-term incentives. Specifically, the reduction in forecasts-meeting behavior is smaller for firms in which short-term incentives are more important before the adoption. More specifically, these firms increase the wealth-performance sensitivity of long-term compensation after adoption. In sum, the results suggest that voluntary clawback adoption is effective at reducing manipulation. Nonetheless, for some firms clawbacks are not sufficiently powerful to deter manipulation and shareholders anticipate a limited recovery.

I extend the baseline model to rationalize the wave of clawback adoption and motivate the instrumental variables strategy. The main ingredient is that clawback adoption by an individual firm generates spillovers over other firms through lower enforcement costs (Bouwman, 2011, Foroughi et al., 2016). Then, complementarities in clawback adoption lead to the coexistence of two equilibria, one with generalized clawback adoption and another with no adoption. As a result, a slight change in regulations can shift the equilibrium regime and trigger a clawback adoption wave.

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5All public firms must comply with the Dodd-Frank clawback, but the SEC’s final rulings are undelivered as of October 2017. See Implementing Dodd-Frank Wall Street Reform and Consumer Protection Act-Upcoming Activity, available at http://www.sec.gov/spotlight/dodd-frank/dfactivity-upcoming.shtml. Moreover, past records of enforcement hint that a hard compliance requirement is unlikely (Fried, 2016).
The remainder of the paper is organized as follows. Section 2 reviews the literature. Section 3 presents the model. Section 4 characterizes the configurations of the optimal contract and the implications of the model. Section 5 presents the empirical results. In Section 6 I discuss the results and provide extensions that rationalize the wave of clawback adoption. Section 7 concludes.

2 Review of the literature

This paper is related to the theoretical literature on manipulation incentives in a principal-agent framework. In Crocker and Slemrod (2007) a manager must exert \textit{ex-ante} unobservable effort and can manipulate an \textit{ex-post} performance metric. Compared to the situation without manipulation, the optimal contract must feature higher pay-for-performance to offset the impact of manipulation on effort incentives. Goldman and Slezak (2006) study a framework where the manager must bear legal penalties after the detection of manipulation. They show how an increase in such penalties increases the sensitivity of compensation to reported performance, which may increase the equilibrium manipulation level.

Pagano and Immordino (2012) show how investment in internal auditing and adjustments in pay-for-performance can simultaneously alleviate empire-building incentives and induce unobservable managerial effort. In Peng and Röell (2014) a manager has an uncertain propensity to manipulate that is privately learned by the manager after the contracting stage. The optimal stock-based pay is more sensitive to reported short-term performance when the dispersion of manipulation propensity is higher—such as in high-growth, high-tech firms. The authors discuss how disclosure regulations improve the design of incentive compensation and reduce earnings manipulation.

To the best of my knowledge, only two papers explicitly analyze the adoption of clawback provisions similar to this paper. In Levine and Smith (2009) a risk-averse and impatient manager can embark in manipulation and shareholders can choose a short-term or a long-term incentive structure. However, what the authors denote as a clawback contract is equivalent to a contract with contingent long-term compensation, neglecting the effect of relaxing limited liability on the optimal compensation structure. In Chen et al. (2014) a manager with mean-variance preferences can manipulate short-term performance. The likelihood of voluntary clawback adoption is inversely related to the

\footnotesize{Early references include Stein (1989), Stein (1988) and Narayanan (1985).}

\footnotesize{Laux (2014) and Laux and Stocken (2012) also highlight the side-effects of increasing penalties to managers on misreporting and misconduct.}
manager’s risk aversion and earnings volatility. The authors provide suggestive reduced-form evidence supporting the theory.\textsuperscript{8}

This paper also connects to the literature that studies the role of deferred compensation in deterring short-termism. Edmans et al. (2012) show that short-termism increases the performance sensitivity of the optimal contract and transfers must take place even after retirement, as in Marinovic and Varas (2017). Makarov and Plantin (2015) show that a long-term contract with contingent deferrals, akin to a clawback contract, can deter managerial risk-taking.

Empirically, the voluntary adoption of clawbacks is more likely in firms with prior executive misbehavior and with more independent governance bodies (Babenko et al., 2015, Addy et al., 2009). Moreover, firm size and peer firms’ adoption are strong predictors of clawback adoption (Chan et al., 2013). Stock prices go up after the adoption (Iskandar-Datta and Jia, 2013). The quality of accounting information improves: financial restatements go down, auditor fees decrease and forecasts-meeting behavior decreases (Dehaan et al., 2013, Chan et al., 2012). Executive compensation tends to increase after the adoption, as well as the pay for performance (Chen et al., 2014, Chan et al., 2012). Managers tend to substitute accruals management for real earnings management, such as reducing R&D expenditures (Chan et al., 2015), and show resistance against restatements (Pyszoha, 2015). I contribute to this literature by exploiting exogenous variation to estimate the effects of clawback adoption.

This paper is also related to the empirical literature on accounting manipulation and the timing and structure of executive compensation. Kedia and Philippon (2009) find that firm growth in periods of manipulation fully reverts in subsequent years. Moreover, managers tend to exercise options before the detection of manipulation. Bennett et al. (2017), Edmans et al. (2017a) and Edmans et al. (2014) find that the timing of equity and option vesting schedules match the timing of firms’ news announcements, which suggests that managers extract rents from misreporting. Efendi et al. (2007), Bergstresser and Philippon (2006) and Burns and Kedia (2006) show that compensation structures with more weight on stock options are associated with more intense manipulation. In this paper, I document the impact of manipulation incentives on the time structure of incentive compensation.

Lastly, this paper also contributes to the literature on the regulation of executive compensation after the 2007-2009 financial crisis. There is agreement among policymakers

\textsuperscript{8}In another related paper Thanassoulis and Tanaka (2017) show that compulsory clawback regulations can be effective at reducing excessive risk-taking in the banking sector.
and practitioners that flawed incentive schemes fuelled managerial misconduct and the subsequent crisis.\textsuperscript{9} In contrast, the academic literature finds little scope for executive pay regulation as the sole or more direct way to solve market failures (Edmans et al., 2017b, Thanassoulis, 2012). In this paper, I provide a theory and some evidence to understand how firms self-regulate to curb manipulation.

3 The model

In this section, I present the ingredients of the theoretical framework. The model features a standard principal-agent setting in which short-term compensation structures may induce earnings manipulation incentives. Clawbacks and deferred compensation are tools that alleviate the manipulation problem and reduce the managerial manipulation rents.

Preferences and technology

Consider a 3-period risk neutral economy. Time is denoted by $t = 0, 1, 2$ and the market rate of return is normalized to zero. Shareholders own a firm with assets in place that yields terminal cash flows $y$ at $t = 2$, which are equal to $y_H$ with probability $e$ and $y_L$ with probability $1 - e$, where $y_H > y_L$.

The firm is operated by a penniless manager, whose unobservable effort decision at $t = 0$ determines the probability of high cash flows $e$. The manager can choose $e = \tau > 0$ or $e = 0$. A choice of $e = 0$ yields some private benefits $B > 0$ to the manager at $t = 0$, which represent the manager’s opportunity cost of effort or perquisite consumption. The manager has a discount factor $\beta \in (0, 1)$, which reflects a higher opportunity cost of funds than that of shareholders.

Terminal cash flows $y$ are distributed to shareholders at $t = 2$, but the manager privately observes $y$ at $t = 1$. With this information, the manager produces an earnings announcement $x \in \{x_L, x_H\}$ at $t = 1$. When cash flows are $y_H$ the manager announces high earnings, $x_H$. However, when cash flows are $y_L$ the manager can manipulate earnings and also announce high earnings $x_H$ with probability $m \in [0, 1]$ and announce low earnings $x_L$ with probability $1 - m$. The manager chooses a manipulation intensity $m \in \{0, \overline{m}\}$ in an unobservable manner at $t = 1$ and incurs a cost $\gamma \geq 0$ from manipulation, $m = \overline{m}$. The probabilistic success of manipulation and the private manipulation cost stem from the \textit{ex-ante} monitoring mechanisms that may prevent the manager from circumventing

internal controls.\footnote{It would be immediate to reformulate the model to another version where the manager can manipulate earnings and distribute them to shareholders in the form of dividends that revert in the long-term, e.g. as in Edmans et al. (2012) and Kedia and Philippon (2009). Moreover, it would also be immediate to generalize the model to the case with non-zero levels of low effort and low manipulation.}

Manipulation can be successful at $t = 1$, but cash flows at $t = 2$ reveal the accuracy of the earnings report. Thus, after a sequence of high earnings and low cash flows, $(x_H, y_L)$, the firm files a financial restatement, which acknowledges the inaccuracy of the prior earnings report and may trigger a clawback.\footnote{There is an equivalent interpretation of the model where the manager embarks in misconduct or fraud, for instance by misrepresenting information about the firm’s return prospects. In that case, the financial restatement at $t = 2$ can be reinterpreted as the discovery of misconduct. For clarity in the exposition and its relationship to the empirical strategy below I stick to the interpretation based on earnings manipulation and a subsequent financial restatement.}

**Incentive compensation contracts**

Shareholders set an incentive compensation contract for the manager at $t = 0$. The contract specifies short-term compensation $w_1$ and long-term compensation $w_2$ contingent on the history of short-term earnings reports, $x$, and terminal cash flows, $y$. Short-term compensation after $x_L$ and $x_H$ is denoted by $w_L$ and $w_H$, respectively. Thus, the term $w_H - w_L$ represents the bonus from a high earnings announcement. Long-term compensation is $w_{HH}$ when the earnings report is accurate, that is after the sequence $(x_H, y_H)$, $w_{HL}$ after a financial restatement, that is after $(x_H, y_L)$, and $w_{LL}$ after an accurate low earnings report, that is after $(x_L, y_L)$.

**Clawback provisions**

The contract between the manager and shareholders must satisfy the standard limited liability constraints of the manager. However, shareholders can adopt a clawback provision, modelled as a binary decision $c \in \{0, 1\}$ at $t = 0$. Clawback adoption, $c = 1$, gives the right to shareholders to recover the short-term bonus $w_H - w_L$ in case of a financial restatement at $t = 2$.\footnote{The limit on the amount to recover follows usual restrictions on the amount and type of compensation that shareholders can recover. Legally, this amount is represented by the part of compensation that is granted only because of manipulation. In this case, the manager would obtain an excess compensation of $w_H - w_L$ because of manipulation.} Nonetheless, clawbacks have an *ex-ante* enforcement cost $\kappa > 0$ and a limited recovery capacity $\ell \in [0, 1]$. The idea is that shareholders may face frictions from the *ex-ante* opposition to clawback adoption from an entrenched manager, as well as *ex-post* resistance to restate earnings and litigation if the clawback is triggered. Thus, shareholders must adopt suitable governance structures or face costly litigation to effectively trigger the
clawback. Alternatively, the enforcement frictions may represent an optimal governance structure that protects the manager from an opportunistic use of the clawback provision. With the possibility of a clawback, the limited liability constraint for \( w_{HL} \) turns into \( w_{HL} \geq -\ell(w_H - w_L) \), while all other elements of \( w_1 \) and \( w_2 \) must be nonnegative.

I illustrate the timing of the model and the structure of compensation in Figure 1.

\[
\begin{align*}
& t = 0 & t = 1 & t = 2 \\
\text{\kappa} & \downarrow & \uparrow & \downarrow & \uparrow \\
\epsilon \in \{0, 1\} & e & \epsilon \in \{0, m\} & 1-e & m \\
B(e) \in \{B, 0\} & y_L, m \in \{0, \bar{m}\} & 1-m & \gamma(m) \in \{0, \gamma\} \\
& w_H & x_H & y_H & w_{HH} \\
& w_L & x_L & y_L & w_{LL} \\
& w_{HL} \geq -\ell(w_H - w_L) & \\ \\
\end{align*}
\]

**Figure 1:** Timing of events in the model.

**Discussion**

The clawback enforcement cost \( \kappa \) and the limited recovery \( \ell \) capture the degree of enforceability of clawback provisions as allowed by the legal framework and the firm-specific governance and accounting information structures. The new set of US regulations on clawback provisions, especially those in the 2010 Dodd-Frank Act, improves the ability of shareholders to claw back compensation. Thus, I interpret the new rules as a reduction in \( \kappa \) and/or an increase in \( \ell \) common to all publicly-traded firms.14

13Opportunistic agents, such as independent directors with reputation concerns or activist shareholders, may be tempted to trigger the clawback despite the manager not manipulating. In such situation, the clawback would interfere with— and make more expensive— the effective provision of incentives to the manager. Thus, it may be optimal to devise weak boards or other governance structures that protect the manager from an unjustified use of clawbacks. Anecdotal evidence shows that activist pressure is an important factor and that corporate boards show reluctance to the adoption of clawbacks. See “Want change? Shareholders have a tool for that”, *The New York Times*, March 21, 2017. Activist pressure regarding clawbacks in the financial industry is also reported in “Banks toughen pay clawbacks under activist shareholder pressure”, *American Banker*, April 30, 2013.

14In Appendix A I provide further details on the institutional setting. In addition, I illustrate how firms disclose their clawback provisions in proxy statements and describe the events surrounding the
As formulated above, the clawback provision relaxes the limited liability constraint, which implies leaving the manager with negative consumption at \( t = 2 \). An alternative interpretation is that the manager only values consumption at \( t = 2 \) and \( 1/\beta \) represents the return of a private investment from \( t = 1 \) to \( t = 2 \). In case of a financial restatement, shareholders can recover the amount \( \ell(w_H - w_L) \), while the manager enjoys the unrecoverable pay and the net returns of the private investment.\(^\text{15}\)

4 Optimal contracts

In this section I study and delimit the candidate configurations of the optimal contract in terms of its time structure, the extent of manipulation and the possibility of clawback adoption. I consider separately two possible scenarios. First, when clawback provisions are unenforceable. Second, when clawback provisions are enforceable but subject to frictions. After studying the contract configurations, I highlight the most relevant implications of the model.

4.1 Candidate configurations of the optimal contract

Consider a compensation contract \((w_1, w_2) = \{(w_H, w_L), (w_{HH}, w_{HL}, w_{LL})\}\) and managerial choices of effort \( e \in \{0, \overline{e}\} \) and manipulation \( m \in \{0, \overline{m}\} \). The manager’s expected utility at \( t = 0 \) is

\[
e(w_H + \beta w_{HH}) + (1 - e)[m(w_H + \beta w_{HL}) + (1 - m)(w_L + \beta w_{LL}) - \gamma(m)] + B(e) \tag{1}
\]

where \( B(0) = B \), \( B(\overline{e}) = 0 \), \( \gamma(0) = 0 \) and \( \gamma(\overline{m}) = \gamma \). To explain equation (1), notice that with probability \( e \) the firm generates high cash flows \( y_H \), while the manager obtains short-term compensation based on earnings, \( w_H \), and long-term compensation—hence the discounting—based on terminal cash flows, \( w_{HH} \). On the other hand, with probability \( 1 - e \) the firm generates low cash flows \( y_L \). However, the manager manipulates with intensity \( m \), incurs a cost \( \gamma(m) \) and receives short-term compensation \( w_{HL} \) after announcing high earnings \( x_H \). When shareholders detect the manipulation the manager receives \( w_{HL} \), which can be negative with a clawback. In case of a low earnings announcement \( x_L \) the manager gets short-term compensation \( w_L \) and long-term compensation \( w_{LL} \).\(^\text{16}\)

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\(^\text{15}\)In Appendix D I provide yet another interpretation for \( \beta < 1 \). I show that short-term compensation can dominate long-term compensation in a signal-jamming version of the model where shareholders must retain the manager at \( t = 1 \). Manipulation reduces the outsiders’ willingness to pay for the manager and the retention costs for shareholders, which makes short-term compensation relatively advantageous.

\(^\text{16}\)The expression for the manager’s expected utility at \( t = 0 \) in equation (1) follows the interpretation that the manager has a private investment from \( t = 1 \) to \( t = 2 \) that yields an above-market recent Wells Fargo scandal.
Using the manager’s expected utility we can analyze the manager’s optimal effort decision at \( t = 0 \) and optimal manipulation decision at \( t = 1 \). By backwards induction, I first study the manipulation decision \( m \in \{0, \overline{m}\} \). From the definition of expected utility (1) the manager chooses \( m = 0 \) instead of \( m = \overline{m} \) if and only if

\[
\overline{m}[w_H - w_L + \beta(w_{HL} - w_{LL})] \leq \gamma . \tag{2}
\]

That is, the manager abstains from manipulation if the expected rents from manipulation are lower than its cost \( \gamma \). The manipulation rents consist of the excess short-term bonus, \( w_H - w_L \), and excess long-term compensation, \( w_{HL} - w_{LL} \), that the manager obtains by manipulating earnings after observing low cash flows \( y_L \) at \( t = 1 \).

Second, from the expression for managerial utility (1), it is clear that the manager exerts effort at \( t = 0, e = \overline{e} \), as long as

\[
\overline{e}[(1 - m)(w_H - w_L) + \beta(w_{HH} - w_{LL}) - m\beta(w_{HL} - w_{LL}) + \gamma(m)] \geq B \tag{3}
\]

where \( m = 0 \) if condition (2) holds and \( m = \overline{m} \) otherwise.\(^{17}\)

In what follows, I assume that it is optimal for shareholders to induce effort and (3) holds. Otherwise, the optimal contract features no incentive compensation at all, which rules out manipulation. Besides, the manager obtains the private benefits \( B \), while shareholders obtain \( y_L \) with certainty.\(^{18}\)

Thus, given a contract \((w_1, w_2) = \{(w_H, w_L), (w_{HH}, w_{HL}, w_{LL})\}\), with clawback adoption decision \( c \in \{0, 1\} \) and managerial decisions \( \overline{e} \) and \( m \in \{0, \overline{m}\} \), the costs of the contract for shareholders are

\[
\overline{e}(w_H + w_{HH}) + (1 - \overline{e})[m(w_H + w_{HL}) + (1 - m)(w_L + w_{LL})] + \kappa c \tag{4}
\]

Shareholders choose the contract that minimizes equation (4) subject to the manager’s incentive compatibility constraint (3), the manager’s limited liability constraints \((w_H, w_L, w_{HH}, w_{LL}) \in \) return \( 1/\beta \). The alternative interpretation where the manager discount all future payoffs involves a re-parametrization by fixing the private benefits parameter to \( B' = B/\beta \). Additionally, one can assume that the manager enjoys the private benefits at \( t = 1 \).

\(^{17}\)If the two values in condition (3) are equal I break the indifference assuming that the manager exerts effort. Similarly, if manipulation condition (2) holds with equality I assume that the manager abstains from manipulation.

\(^{18}\)The assumption boils down to managerial effort generating sufficient additional cash flows— given by the term \( \overline{e}(y_H - y_L) \)— to compensate the incentive compensation costs. Another implicit assumption throughout is that \( y_H \) and \( y_L \) sufficiently high, so that the firm generates enough funds to finance any short-term and long-term compensation to the manager.
$R^4_+$, the manipulation decision $m$ being determined by condition (2) and the clawback constraint

$$w_{HL} \geq -c\ell(w_H - w_L).$$

In the absence of a clawback provision, $c = 0$, this last constraint becomes a standard limited liability constraint, i.e. $w_{HL} \geq 0$.

The following lemma establishes the nodes in which positive levels of managerial compensation are suboptimal and the constraints that bind in the optimal contract. All proofs appear in Appendix B.

**Lemma 1.** In the optimal contract $w_L = w_{LL} = 0$, the clawback constraint binds, $w_{HL} = -c\ell w_H$, and the incentive compatibility constraint (3) binds.

Shareholders compensate the manager in those nodes that are more informative about the manager choosing $e = \pi$ (Holmström, 1979). These nodes are the short-term high earnings report, $x_H$, and the long-term high cash flows realization, $y_H$. Moreover, shareholders exhaust the clawback—when adopted—to its legal or feasible limit, since a financial restatement is informative about a low effort decision, $e = 0$.

With $w_L = w_{LL} = 0$, $w_{HL} = -c\ell w_H$ and a binding incentive compatibility constraint, the manipulation condition, expression (2), and effort incentive-compatibility constraint, expression (3), can be written as

$$w_H \leq \frac{\gamma}{(1 - \beta c\ell)m} \left(1 - m(1 - \beta c\ell)\right)w_H + \beta w_{HH} = \frac{B}{e} - \gamma(m)$$

From condition (6) notice that the possibility of manipulation, $m = \bar{m}$, dampens the effort incentives provided through short-term compensation. That is, the temptations to choose $e = 0$ are bigger, because the manager can obtain the private benefits $B$ and manipulate earnings to obtain $w_H$. Moreover, if the manager does not manipulate, $m = 0$, each unit of short-term compensation is unambiguously more effective at inducing effort, and thus cheaper, due to the manager’s discounting of deferred compensation, $\beta < 1$.

The term $\frac{\gamma}{(1 - \beta c\ell)m}$ on the right hand side of condition (5) summarizes the costs of manipulation for the manager. It represents the maximum level of short-term pay $w_H$ that prevents manipulation. Similarly, the term $\frac{B}{e}$ on the right-hand side of condition (6) summarizes the severity of the unobservable effort problem, i.e. the standard agency problem. It represents the minimum level of short-term pay that induces effort when the
manager chooses \( m = 0 \). Thus, if \( \frac{B}{\bar{e}} > \frac{\gamma}{(1 - 3\beta m)} \) the manipulation problem is severe, that is, full short-term compensation contracts induce manipulation.

What is the role of clawbacks? Clawback provisions have the obvious effect of reducing compensation costs through the recovery of short-term pay, provided that the manager manipulates. But conditions (5) and (6) also show that a clawback provision, \( c = 1 \), (i) has an effect qualitatively equivalent to an increase in the personal cost of manipulation and (ii) improves the effort incentives of short-term compensation. In other words, the manipulation problem becomes less severe. In particular, the effectiveness of the clawback increases with \( \beta \) and \( \ell \), since long-term and short-term rewards give similar utility to the manager and shareholders can recover more compensation.

**Contracts without clawback**

To better understand the mechanisms at play, I first study the candidate configurations of the optimal contract in the absence of clawbacks, \( c = 0 \). The next proposition shows that short-term compensation contracts are optimal when the manipulation problem is weak and shareholders attain the minimum compensation cost, given by \( B \).

**Proposition 1.** If \( \frac{B}{\bar{e}} \leq \frac{\gamma}{m} \) the optimal contract without clawback pays only a short-term bonus \( w_H = B/\bar{e} \) and features no manipulation, \( m = 0 \). The expected cost of this contract is \( B \).

Conversely, when manipulation incentives are severe, the optimal contract generates compensation costs for shareholders that are higher than \( B \). I characterize the candidate configurations of the optimal contract in the next proposition.

**Proposition 2.** If \( \frac{B}{\bar{e}} > \frac{\gamma}{m} \) the optimal contract without clawback is the cheapest of the following:

1. A combination of short-term and long-term compensation that induces no manipulation, namely

   \[
   w_H = \frac{\gamma}{m} \text{ and } w_{HH} = \frac{1}{\beta} \left( \frac{B}{\bar{e}} - \frac{\gamma}{m} \right) .
   \]

   The expected cost of this contract is \( W_{L+S} = B + \frac{1-\beta}{\beta} \left( B - \frac{\gamma}{m} \right) > B \).

2. Short-term compensation, featuring manipulation, namely

   \[
   w_H = \frac{B/\bar{e} - \gamma}{1 - m} \text{ and } w_{HH} = 0 .
   \]

   The expected cost of this contract is \( W_S = \bar{e} + \frac{m}{1-\ell} \left( \frac{B}{\bar{e}} - \gamma \right) > B \).
To sum up, when manipulation incentives are severe, the optimal contract without clawback has one of two possible configurations. The first is a partly-deferred compensation contract that deters manipulation, \( m = 0 \). In this contract, \( w_H \) and \( w_{HH} \) are set at those levels that, respectively, prevent manipulation and minimize the cost of deferrals generated by \( \beta < 1 \).

The second, meanwhile, is an entirely short-term compensation contract that features manipulation as a second-best side effect, \( m = \bar{m} \). The term \( \frac{1}{1-\bar{m}} \) in equation (8) shows how short-term incentive compensation must be relatively more “high-powered” to induce the desired effort incentives. That is, given a set of parameters, contracts that induce manipulation must feature higher performance sensitivity of short-term pay. Moreover, shareholders must compensate the manager more frequently, with probability \( \bar{e}+(1-\bar{e})\bar{m} \), due to manipulation.

**Contracts with clawback**

Now I study the configurations of the optimal contract conditional on clawback adoption, \( c = 1 \). The next two propositions show the candidate contract configurations, which are analogous to Propositions 1 and 2, with the additional feature that the clawback provision reduces the manager’s rewards from manipulation.

**Proposition 3.** If \( \frac{B}{\bar{e}} \leq \frac{\gamma}{(1-\beta\ell)\bar{m}} \) the optimal contract with clawback pays \( w_H = \frac{B}{\bar{e}} \), features no manipulation, \( m = 0 \), and has a cost \( B + \kappa \).

The possibility of clawback expands the region of parameters where the manipulation problem is weak and using short-term compensation is optimal. The expansion is greater as the degree of recovery, \( \ell \), and managerial discounting, \( \beta \), increase, since the clawback is more effective. However, a clawback may not be sufficient to remove the manipulation incentives induced by fully short-term compensation contracts, because the manager may still enjoy some stream of short-term consumption that exceeds the costs of manipulation. In that case, shareholders can either tolerate manipulation or defer compensation and incur in some deferral costs in analogy with Proposition 2, as the following proposition shows.

**Proposition 4.** If \( \frac{B}{\bar{e}} > \frac{\gamma}{(1-\beta\ell)\bar{m}} \) the optimal contract with clawback is the cheapest of the following:

1. A combination of short-term and long-term compensation that induces no manipulation, namely

\[
w_H = \frac{\gamma}{(1-\beta\ell)\bar{m}} \quad \text{and} \quad w_{HH} = \frac{1}{\beta} \left( \frac{B}{\bar{e}} - \frac{\gamma}{(1-\beta\ell)\bar{m}} \right).
\]
The compensation cost of this contract is $W_{C,L+S} = B + \frac{1-\beta}{\beta} \left( B - \frac{e}{\gamma (1-\beta\ell)} \right) < W_{L+S}$.

2. Short-term compensation, featuring manipulation, namely

$$w_H = \frac{B/e - \gamma}{1 - \bar{m}(1 - \beta\ell)} \text{ and } w_{HH} = 0.$$

The compensation cost of this contract is $W_{C,S} = \frac{e(1-\tau)\bar{m}(1-\ell)}{1-\bar{m}(1-\beta\ell)} \left( \frac{B}{e} - \gamma \right) < W_S$.

Then, the cost of the clawback contract is $W_C + \kappa = \min\{W_{C,L+S}, W_{C,S}\} + \kappa$.

Hence, contracts with clawback allow shareholders to reduce the direct compensation burden—net of enforcement costs $\kappa$—relative to the contracts without clawback. A clawback contract reduces the manager’s temptation to choose $m = \bar{m}$ at $t = 1$ and, thus, $e = 0$ at $t = 0$.

Clawback provisions alleviate the manipulation problem induced by short-term compensation, but the optimal contract may differ from an exclusively short-term compensation contract. Shareholders may opt to defer compensation after the clawback adoption since a clawback contract allows to put a bigger weight on short-term incentives while incurring in lower deferral costs. In contrast, a fully short-term compensation contract may still grant some manipulation rents to the manager. The next proposition states that the partly-deferred compensation clawback contract arises as a candidate optimal contract only if shareholders face a limited recovery.

**Proposition 5.** If clawbacks have perfect recovery, $\ell = 1$, the optimal contract with clawback is always an exclusively short-term compensation contract.

The optimal clawback contract with perfect recovery is always short-term compensation because shareholders avoid the costs of deferrals, $\beta < 1$, and pay the manager with the same frequency as in a contract with long-term compensation and no manipulation—i.e. with probability $\bar{c}$.

4.2 Optimal contracts and implications of clawback adoption

In this section, I summarize the main implications of the model. First, I analyze the optimal contracts when clawbacks are unenforceable. In particular, I highlight the regions of parameters where manipulation is an optimal outcome and its implications on the structure of compensation. Second, I study the determinants of clawback adoption. Third, I provide predictions for the effects of clawback adoption on manipulation and the time structure of managerial compensation.
The case of unenforceable clawbacks

Suppose that clawback provisions are unenforceable. For instance, the legal framework may rule out the violation of managerial limited liability or the recovery may be too costly or limited. There exist three possible configurations of the optimal contract. First, if the manipulation problem is weak, Proposition 1 states that the optimal contract is always a short-term compensation contract that induces no manipulation. Second, under a severe manipulation problem, Proposition 2 states that shareholders choose between two contract configurations. The first is a short-term compensation contract with manipulation and cost $W_S$, which requires shareholders to pay high and frequent short-term bonuses. The second is a contract with partly deferred compensation and cost $W_{L+S}$, which deters manipulation but requires costly deferrals. The next proposition provides the conditions under which manipulation and short-term compensation are the optimal outcomes.

**Proposition 6.** Suppose that clawback provisions are unenforceable. The contract that features exclusively short-term compensation and induces manipulation is optimal ($W_S < W_{L+S}$) when $B$ is high, $\beta$ is low and $\gamma$ is low.

Manipulation is the optimal outcome when the managerial discount factor, $\beta$, is sufficiently low, i.e. when deferring compensation becomes significantly expensive. Hazarika et al. (2012) find that more intense forced CEO turnover, a proxy for a low $\beta$, is associated with more intense earnings management.\(^{19}\)

Besides, manipulation is optimal when the private benefits $B$ are high since the cost of deferrals exceeds the manipulation rents of the manager. A suitable proxy for $B$ is firm size. For instance, Gayle et al. (2015) show that firm size differentials in the level of executive compensation can be explained by shareholders receiving noisier information about managerial performance in bigger firms.\(^ {20}\) Regarding the relationship between accounting manipulation and firm size Burgstahler and Dichev (1997) report that medium-sized and big firms tend to show extensive earnings management to avoid earnings decreases. In addition, Nelson et al. (2002) show that Big 5 audit firms are more likely to accept attempts of earnings management made by bigger firms.

Lastly, manipulation is optimal when the personal costs of manipulation $\gamma$ decrease,

\(^{19}\)Proposition 6 is silent about the effect of the intensity of manipulation, $m$, and the probability of high cash flows, $p$, on the optimality of manipulation contracts. This is because manipulation is the optimal outcome for intermediate values of both parameters, that is, when manipulation represents a mild and not too frequent possibility. This is consistent with real-world cases where manipulation scandals arise often as a surprise, as argued by Peng and Röell (2014). That is, the ex-ante adjustment in security prices is small given the little likelihood of manipulation, so the ex-post reaction in prices after the detection must be large.

\(^{20}\)Other theoretical and/or empirical interpretations for the relationship between moral hazard, firm size and executive compensation are Dicks (2012), Edmans et al. (2009) and Gayle and Miller (2009).
which increases the required level of deferrals in the partly-deferred compensation contract. Suitable proxies for $\gamma$ are measures of the strength of ex-ante monitoring. In this respect, a direct empirical implication from Propositions 2 and 6 is that compensation structures that induce manipulation feature higher performance sensitivity of short-term pay. Since, given firm size, $B$, manipulation is more likely to take place for managers with greater impatience in firms with weaker monitoring, the next testable implications follow.

**Predictions 1.** Given firm size ($B$), the performance sensitivity of short-term incentives ($w_H$) decreases in the strength of ex-ante monitoring ($\gamma$) and in managerial patience ($\beta$).

**Determinants of clawback adoption**

Suppose that clawback adoption is feasible but subject to frictions. Then, adoption is determined by comparing the expected compensation costs associated with each candidate contract presented in Propositions 1 to 4. In the particular case where fully short-term contracts with clawback deter manipulation, $B/\bar{e} \leq \gamma/(1 - \beta \ell)m$, the model predicts that firms that face more severe agency problems, higher $B/\bar{e}$, weaker internal monitoring, lower $\gamma/m$, higher impatience, low $\beta$, and lower enforcement costs $\kappa$ are more likely to benefit from and adopt a clawback provision. That is, the adoption of clawbacks that effectively deter manipulation is more valuable in bigger firms where ex-ante monitoring is weaker, but also have more independent governance bodies that increase the probability of detection and ex-post enforcement of clawbacks. I summarize the predictions in the following result.

**Predictions 2.** Clawback adoption is more valuable in big firms (high $B$) with weak ex-ante monitoring (low $\gamma$) but strong enforcement (low $\kappa$, high $\ell$).

Clawbacks, as long as they carry an enforcement cost, are less valuable for firms that cannot deter manipulation in fully short-term compensation contracts with the adoption, i.e $B/\bar{e} > \gamma/(1 - \beta \ell)m$. In general, clawbacks are more valuable as enforcement is more effective, i.e. as $\ell$ increases and $\kappa$ decreases.

**Effects of clawback adoption**

What is the impact of clawbacks on the optimal time structure of compensation and the extent of manipulation? Here I discuss the predictions of how firms adapt their compensation structures and how manipulation changes after an exogenous reduction in the enforcement costs, $\kappa$, that leads to clawback adoption— e.g. driven by changes in regulation, firm-specific governance structures, or, as I discuss in extensions, the influence of

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21Proposition B.1 in Appendix B provides detailed formal arguments for the discussion that I develop in the main text.
peer firms’ adoption.

Figure 2 illustrates the effects of clawback adoption. The left panel depicts the configuration of the optimal contracts in the space delimited by the severity of the agency problems $B/\tau$ and discount factor $\beta$ when clawbacks are unenforceable. Consistent with the predictions of Proposition 6, manipulation is optimal for high private benefits and low discount factors. The right panel depicts how contract configurations change when enforcement costs drop to zero, but recovery is still limited, $\ell < 1$. In such situation, adoption is always optimal in the region where $B/\tau > \gamma/\bar{m}$, since clawbacks always reduce compensation costs, while it adds no value for $B/\tau \leq \gamma/\bar{m}$.

Two main features on the right panel of Figure 2 are noticeable regarding the impact of clawback adoption on the extent of manipulation. The first is that, as follows from Proposition 3, clawbacks expand the region of parameters where managers abstain from manipulation while receiving all incentives in the short-term. The second feature is that clawback adoption removes manipulation in part of the region of parameters where, without clawback, manipulation is optimal— region $(S, \bar{m})$ on the left panel. Specifically, the reduction in manipulation happens because a clawback (i) is effective at deterring manipulation in a fully short-term contract— region $(S, 0)$— or (ii) increases the attractiveness of deferred compensation contracts— region $(S + L, 0)$. The latter case is possible only because of a limited clawback recovery, $\ell < 1$.

**Figure 2:** Configuration of optimal contracts in the $(B/\tau, \beta)$ space. The left panel depicts the case where clawback provisions are unenforceable. $(S, 0)$ denotes the region where short-term contracts are optimal without manipulation, $(S, \bar{m})$ denotes the region where short-term contracts are optimal and induce manipulation, $(S + L, 0)$ denotes the region where contracts with deferred compensation are optimal. The right panel depicts the case where clawback provisions are enforceable at no cost, $\kappa = 0$, but recovery is limited, $\ell < 1$. The dashed lines on the right-hand panel represent the frontiers that delimit the three regions of optimal contracts on the left panel.
Figure 2 also illustrates that the impact of clawback adoption on the time structure of managerial compensation is heterogeneous across the pre-adoption contract configurations. On the one hand, in the region where deferring some part of compensation is optimal without clawbacks—region \((S + L, 0)\) on the left panel—, clawback adoption increases the performance sensitivity of short-term compensation. This is because, starting from a pre-adoption short-term payment of \(\gamma/m\) that is insufficient to provide all effort incentives, firms switch to fully short-term contracts or stick to partly-deferred compensation that pays \(\gamma/(1-\beta\ell)m\) in the short-term and defers a smaller part of incentives.

The increased reliance on short-term compensation structures may have side effects on the intensity of manipulation. Whenever clawbacks are ineffective at deterring manipulation, a shift from partly-deferred to fully short-term compensation with clawback leads to more intense manipulation. Although clawback adoption avoids the costs of deferrals, shareholders may still have to tolerate manipulation as the second-best option.\(^{22}\)

On the other hand, in the region where manipulation is optimal without clawbacks—\((S, m)\) on the left panel—, firms reduce the performance sensitivity of short-term compensation. This is because firms stick to fully short-term compensation contracts, with clawbacks reducing the steepness of short-term incentives, or because firms switch to partly-deferred compensation structures. More specifically, the latter subset of firms increases the performance sensitivity of long-term compensation after the adoption.\(^{23}\)

I summarize the above discussion in the following result.

**Predictions 3. Effects of clawback adoption on manipulation:**

- Clawback adopters reduce the intensity of manipulation, but the reduction is less likely for firms with greater pre-adoption reliance on short-term incentives.

**Effects of clawback adoption on the time structure of managerial compensation:**

- Adopting firms that rely on deferred compensation before the adoption increase the performance sensitivity of short-term compensation after the adoption.

- In contrast, adopting firms that rely on short-term compensation and induce manipulation before the adoption reduce the performance sensitivity of short-term compensation after the adoption. Moreover, in the presence of enforcement frictions, this subset of firms increases the performance sensitivity of long-term compensation.

\(^{22}\)This last point is also true for those firms that, because of the implied reduction in compensation costs, find it optimal to induce effort with short-term pay after clawback adoption. This is akin to the results of Goldman and Slezak (2006).

\(^{23}\)It is easily verified that the short-term incentives in a contract with manipulation and without clawback exceed the size of the short-term incentives in a clawback contract with partly-deferred compensation.
5 Empirical evidence

In this section, I provide empirical evidence that confirms the predictions of the model. The contribution of the empirical section is threefold. First, I document that executives in large US public firms receive greater short-term incentives when they systematically announce earnings that are close to the analysts’ forecasts, taken as a proxy for the weakness of internal monitoring. Second, I show that firm size, director independence and peer adoption are the most relevant determinants of clawback adoption. Lastly, I use an instrumental variables strategy and find that clawback adoption reduces the frequency of forecasts-meeting behavior. However, the reduction is lower for firms that pre-adoption rely relatively more on short-term compensation, firms that also tend to defer compensation after the adoption. This empirical evidence, interpreted through the lenses of the model, allows an evaluation of the effects of the process of generalized clawback adoption.

5.1 Data

I compile a dataset that covers information for the 2002-2016 period on executive compensation, earnings announcements and corporate governance. I extract executive compensation and firm-level information from Execucomp and Compustat, earnings forecasts and announcements from IBES, director information from ISS and restatement information from Audit Analytics. Moreover, I construct a clawback adoption database by using a web crawler that extracts keywords related to clawback provisions from DEF14A proxy statements in the SEC’s EDGAR database.24

As a measure of managerial incentives, I consider the wealth-performance sensitivity of executive compensation, following Edmans et al. (2009). This variable, denoted by \( \Delta_{\text{Total}} \), measures the increase in an executive’s wealth (in million dollars) out of a one percent increase in shareholder value. In order to analyze the time structure of incentive pay, I split \( \Delta_{\text{Total}} \) in two components. First, I denote by \( \Delta_{S} \) the increase in wealth from the portfolio of vested stock and stock options, whose liquidation value is more sensitive to short-term manipulation decisions. The remaining part of \( \Delta_{\text{Total}} \) represents the long-term component of incentives, denoted by \( \Delta_{L} \).25

Firms tend to embark in earnings management around analysts’ forecasts, or “meet”

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24 I provide further details on the construction of the dataset in Appendix C.
25 Appendix C provides the details on the computation of the wealth-performance sensitivities. Some part of the long-term delta at the end of a fiscal year may capture some compensation that vests in a few months, akin to a short-term component. Thus, the measured \( \Delta_{L} \) represents an upper bound on the value of illiquid securities held by an executive.
and “beat” behavior (Dechow et al., 2010). Therefore, as a proxy for weak internal monitoring, I define the indicator variable Meet that takes a value of one when a firm reports earnings per share $0.01 below or above the median of the last record of analysts’ forecasts, and zero otherwise. As an alternative measure of earnings management incentives, I also consider financial restatements denoted by the indicator variable Restate.

5.2 Manipulation and the time structure of executive pay

The first aim of the empirical analysis is to test the results of Prediction 1. That is, I estimate the relationship between the time structure of executive compensation and the tendency of executives to meet analysts’ targets as a proxy of weak internal monitoring. In order to better capture the tendencies of a manager to manipulate earnings I compute the forecasts-meeting frequency for each executive $i$ in firm $j$ observed after $t$ periods, that is

$$Meet \text{Freq}_{ijt} = \frac{1}{t} \sum_{s=1}^{t} Meet_{ijs}.$$ 

Compensation variables are measured as of fiscal year-end, while earnings announcements usually take place in the first quarter of a fiscal year. Thus, $Meet \text{Freq}$ is a predetermined variable from the perspective of executive incentives. In Appendix C I use the theoretical results and the parametric assumptions in Gabaix and Landier (2008) to motivate the following empirical specification that relates the level of short-term incentives with meet behavior:

$$\ln(\Delta S)_{ijt} = \beta_0 + \beta_1 \ln(Size)_{ijt} + \beta_2 \text{Meet Freq}_{ijt} + \Gamma'X_{ijt} + \varepsilon_{ijt} \quad (9)$$

Following Prediction 1, the coefficient $\beta_2$ is positive, suggesting that weak ex-ante internal monitoring increase the sensitivity of short-term incentives. As in Edmans et al. (2009) I define $Size$ by total firm value and $X_{ijt}$ represents a set of controls, including year and industry fixed-effects. Arguably, forecasts-meeting is likely to be involuntary if a firm displays a low forecasts dispersion—i.e. analysts may have low uncertainty and the firm provides accurate information. Thus, the controls $X_{ijt}$ include the (log) average dispersion in earnings forecasts across the executive’s tenure. In addition, I control for the actual earnings report to separate the explanatory power of meet behavior from the level of reported earnings.

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26Dechow et al. (2010) survey the suitability of multiple proxies of earnings manipulation that are popular in the accounting literature. They conclude that “meet” and “beat” behavior is informative about earnings management practices. Firms use several mechanisms to meet earnings forecasts, such as managing tax expenses or accruals, repurchasing stock, and selling fixed assets or marketable securities.

27In Appendix C I report descriptive statistics and univariate tests across the samples of Meet and Restate and variable definitions.
I present the results in Table 1. The table reports that executives with higher records of meet behavior receive more short-term incentives. The coefficients are statistically significant and remain robust to the inclusion of forecast dispersion as a control. Besides, the results are robust to the introduction of firm fixed effects that control for unobservable fixed determinants of short-term incentives. An executive that meets the earnings forecasts in every period obtains a 60% increase in the size of short-term incentives. In contrast, more frequent restatements, that proxy for stronger ex-post detection, translate into lower short-term incentives. The results suggest that meet behavior is related to executives receiving steeper short-term incentives due to weak ex-ante internal monitoring, which is consistent with the model predictions.28

Table 1: Forecasts-meeting and short-term incentives. Dependent variable: Ln(ΔS)

<table>
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<th>(3)</th>
<th>(4)</th>
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<td></td>
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<td>0.08***</td>
<td>0.05**</td>
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<td></td>
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<td>(0.02)</td>
<td>(0.02)</td>
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<td>-3.39***</td>
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<td></td>
<td>(0.61)</td>
<td>(0.61)</td>
<td>(0.83)</td>
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<td>Restate Freq</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(0.08)</td>
<td></td>
<td></td>
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<td>52666</td>
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<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

This table reports results from estimations of equation (9) for executive-firm level observations in the 2002-2016 period. Standard errors clustered at the 2-digit SIC industry level in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

28 It can be argued that if short-term manipulation has also detrimental effects on long-term outcomes the relevant measure is the ratio of short-term over total incentives. From the perspective of the theoretical model, the manager manipulates knowing that the long-term value of the firm is low. Thus, the only relevant measure is the short-term incentives. In Appendix C I show that the results in Table 1 are also robust to using $\Delta S/\Delta_{total}$ as a dependent variable.
5.3 The determinants and effects of clawback adoption

Table 2 reports estimation results that uncover the main determinants of clawback adoption. Specifically, I estimate logit models for the probability of clawback adoption on a set of firm characteristics. The results show that firm size, director independence and peer adoption have a positive and statistically significant relationship with the likelihood of clawback adoption, while CEO tenure is negatively associated with the adoption. An analysis by different time windows suggests that the effect of size decays over time, while peer adoption becomes significant in the years after 2007. Furthermore, adoption is positively associated with past restatement behavior in the 2002-2007 period. This hints that early adopters have stronger ex post enforcement structures, which favors the adoption as implied by Prediction 2.²⁹

The final aim of this section is to estimate the effects of clawback adoption on outcome variables of interest, namely, manipulation intensity or the time structure of managerial incentives. In particular, the interest lies on testing the implications from Prediction 3, which states the heterogeneous response of firms to clawback adoption across the pre-adoption importance of short-term incentives. Thus, for an outcome variable \( y \) I estimate the following specification

\[
y_{ijkt} = \alpha_1 \text{Clawback}_{ijkt} + \alpha_2 \text{Clawback}_{ijkt} \times \left( \frac{\Delta S}{\Delta \text{Total}} \right)_{ijkt2002} + \Lambda X_{ijkt} + \eta_j + \varepsilon_{ijkt} \tag{10}
\]

where \( i \) indexes an executive, \( j \) a firm, \( k \) and industry and \( t \) time. \( \eta_j \) represents firm fixed-effects that control for fixed unobservable determinants of the outcome variables and \( X_{ijkt} \) is a set of controls that include time fixed-effects.

Prediction 3 states that when \( y \) is a measure of manipulation \( \alpha_1 \) is negative and \( \alpha_2 \) is positive. That is, clawbacks are less effective when pre-adoption short-term incentives are more important, taken as a proxy for weak monitoring and a low effectiveness of clawbacks. If \( y \) represents a measure of total incentives \( \alpha_1 \) is negative, since clawbacks reduce the cost of inducing effort and \( \alpha_2 \) is positive, due to the lower effectiveness of clawbacks.

Similarly, if \( y \) represents a measure of long-term incentives \( \alpha_1 \) is negative, since clawbacks reduce the cost of short-term incentive compensation. Importantly, if \( \alpha_2 \) is positive the results suggest that clawback adoption entails limited recovery. Lastly, if \( y \) represents the short-term component of incentives the model predicts a positive value for \( \alpha_1 \) and a

²⁹The web crawler algorithm that identifies clawback adoption may be subject to misclassification issues. I perform several tests, reported in Appendix C, which suggest that there is little misclassification.
## Table 2: Determinants of clawback adoption

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<td>(0.04)</td>
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<tr>
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<td>0.13*</td>
<td>0.14***</td>
<td>0.15***</td>
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<tr>
<td>Meet Freq</td>
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<td>0.23</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>(0.22)</td>
<td>(0.44)</td>
<td>(0.23)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>Loss Freq</td>
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<td>-0.33</td>
<td>-0.23</td>
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<td></td>
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<td>(1.01)</td>
<td>(0.37)</td>
<td>(0.56)</td>
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<tr>
<td>Industry adoption</td>
<td>0.02***</td>
<td>0.01</td>
<td>0.02***</td>
<td>0.02**</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.01)</td>
<td>(0.00)</td>
<td>(0.01)</td>
</tr>
<tr>
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<td>5537</td>
<td>1919</td>
</tr>
<tr>
<td>Pseudo $R^2$</td>
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<td>0.35</td>
<td>0.11</td>
<td>0.06</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
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This table reports the results from logit estimations for the probability of clawback adoption in the 2002-2016 period. I define industry adoption as the value-weighted share of adopting firms in the same industry at the 2-digit SIC level. Standard errors clustered at the 2-digit SIC industry level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. 
negative value for $\alpha_2$. That is, firms switch to short-term incentive compensation since it becomes cheaper, but firms with already important short-term incentives will reduce the steepness of short-term incentives.

The main identification concern is that clawback adoption may be correlated with unobservable omitted time-varying factors that are correlated with the outcome variables. For instance, firms can experience changes in ownership or governance that shift preferences of shareholders or director to meet short-term performance targets, including the adoption of clawbacks and an increase in short-term incentives or a reduction in the intensity of internal monitoring.

I propose an instrumental variables (IV) strategy to ameliorate the endogeneity of clawback adoption. Specifically, I exploit the wave of clawback adoption and the cross-industry variation in clawback adoption shares as a source of exogenous variation. I construct the instrumental variable as follows. For each industry $k$—defined at the 2-digit SIC level—I compute the value-weighted share of clawback adoption, that is

$$Adoption_{kt} = \frac{\sum_{j} \frac{Firm\ value_{jkt}}{\sum_{h \in k} Firm\ value_{hkt}} \times Clawback_{jkt}}{\sum_{j} Firm\ value_{jkt}}$$

The reason for weighting by firm value is that bigger firms are early-adopters and their adoption decision may be more informative about the value clawbacks for the remaining, smaller, firms in an industry. $Adoption_{kt}$ is not a suitable instrument for individual clawback adoption. For instance, adoption by other firms in an industry can relax competitive pressures for talent within the industry and alter compensation structures. Moreover, a reputation channel may also be at work by which individual firms may face reputation costs if their managers manipulate while peers can use clawbacks at disposal. Such a reputation mechanism may induce changes in compensation structures and \textit{ex-ante} monitoring structures. Thus, in order to circumvent these issues, I choose as an instrumental variable the “leave-one-out” average adoption share for each industry

$$Adoption\ Other_{kt} = \frac{1}{K - 1} \sum_{l \neq k} Adoption_{lt}$$

where $K$ denotes the total number of industries.\footnote{The approach to the construction of the instrument is related to the so-called “Bartik” instruments literature (Goldsmith-Pinkham et al., 2017).} The relevance of the instrument $Adoption\ Other_{kt}$ rests on the existence of cross-industry variation in the pace of clawback adoption. That is, the instrument exploits the within-industry peer effects that determine clawback adoption by individual firms and that generate above/below trends
in industry clawback adoption. The validity of the instrument rests crucially on the exclusion restriction that unobservable time-varying governance changes that determine clawback adoption in other industries are uncorrelated with the firm-level outcomes. The exclusion restriction is satisfied if shareholders value managers according to their industry-specific skills, so competitive pressures are independent from clawback adoption decisions in another industry, and if firms are unaffected by reputation issues when clawback adoption takes place in other industries.\textsuperscript{31}

The control variables $X_{ijkt}$ in equation (10) include contemporaneous values form firm characteristics: firm size, independent directors and reported earnings. To alleviate endogeneity concerns associated with these controls, I instrument them by their value measured as of 2002, when clawback regulations were non-existent, interacted with time-effects to capture exogenous trends common across firms. The controls also include, depending on the left-hand side variable, the past frequencies of forecasts-meeting, losses and the existence of a Big 4 firm as an audit, as well as the (log) average dispersion of earnings forecasts.

The first two columns in Table 3 report the effects of clawback provisions on the frequency of forecasts-meeting and financial restatements. The results uncover a reduction in forecasts-meeting and restatements. In line with Prediction 3, the reductions are smaller in the pre-determined share of short-term incentives. This suggests that firms using compensation structures tilted towards the short-term are unable or unwilling to introduce effective monitoring structures that reduce manipulation.

The remaining three columns in Table 3 report the effects of clawback adoption on the structure of executives’ incentives. The estimates in the third column suggest that firms with more intense reliance on short-term incentives before the adoption reduce the performance sensitivity of short-term compensation, as measured by $\Delta S$. This also confirms part of Prediction 3.

In the fourth column the estimates suggest that clawback adoption reduces the level of long-term incentives, given by $\Delta L$, but the reduction is smaller for those firms that relied more on short-term incentives before the adoption. Specifically, the net effect of adoption is positive for firms with a close to one pre-adoption importance of short-term incentives. Thus, for this subset of firms clawback adoptions increases the level of long-term incentives and reduces the level of short-term incentives.

\textsuperscript{31}Lustig et al. (2011) highlight that the accumulation of firm-specific skills can explain the growing dispersion in managerial compensation. In a similar fashion, Fee et al. (2015) find that job transitions are infrequent for CEOs, who are demoted to worse jobs after a departure.
Lastly, the fifth column reports the results for the level of total incentives. The estimates suggest that total incentives are less steep, in line with clawbacks being effective at inducing better effort incentives. Again, the reduction is smaller for firms with greater pre-adoption reliance on short-term incentives.

**Table 3:** Effects of clawback adoption on executive compensation and earnings manipulation

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Meet</td>
<td>Restate</td>
<td>Ln($\Delta_S$)</td>
<td>Ln($\Delta_L$)</td>
<td>Ln($\Delta_{Total}$)</td>
</tr>
<tr>
<td>Clawback</td>
<td>-0.29***</td>
<td>-0.12***</td>
<td>-0.08</td>
<td>-1.67***</td>
<td>-0.66***</td>
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<tr>
<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.09)</td>
<td>(0.08)</td>
<td>(0.10)</td>
</tr>
<tr>
<td>Clawback × $\Delta_S/\Delta_{Total}$ 2002</td>
<td>0.28***</td>
<td>0.08***</td>
<td>-0.91***</td>
<td>2.08***</td>
<td>0.36***</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.03)</td>
<td>(0.16)</td>
<td>(0.09)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Observations</td>
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<td>4384</td>
<td>19529</td>
<td>20439</td>
<td>20405</td>
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<tr>
<td>F 1st stage</td>
<td>19.78</td>
<td>17.47</td>
<td>21.32</td>
<td>20.57</td>
<td>20.81</td>
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<tr>
<td>F 1st stage (2)</td>
<td>111.37</td>
<td>118.71</td>
<td>76.08</td>
<td>94.18</td>
<td>85.39</td>
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<td>.5</td>
<td>.31</td>
<td>.48</td>
<td>.31</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Firm FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

This table reports the results from 2-stage least squares regressions of clawback adoption on executive incentive measures and earnings manipulation proxies for the 2002-2016 period. The models use as instrument the leave-one-out average share of value-weighted adoption across industries. In the first two columns control variables are log firm size, reported earnings, loss frequency, Big 4 frequency, independent directors, CEO tenure and earnings forecasts dispersion. In the last three columns control variables are log firm size, reported earnings, independent directors, meet frequency and earnings forecasts dispersion. In all columns I instrument log firm size, reported earnings and independent directors by their values measured as of 2002 interacted with year dummies. Standard errors clustered at the 2-digit SIC industry level in parentheses. F 1st stage and F 1st stage (2) denote, respectively, the F statistics of the first-stage regressions of clawback adoption and its interaction with $\Delta_S/\Delta_{Total}$ in 2002 on Other Adoption and Other adoption interacted with $\Delta_S/\Delta_{Total}$ in 2002. The F statistics correspond first stage regressions where exogenous variables are partialled-out. J p-value reports the p-value for the test of over-identifying restrictions. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

### 6 Discussion of results and extensions

#### 6.1 Discussion and policy implications

The empirical results suggest that clawback adoption reduces meet behavior, which reinforces the idea that target-beating is associated with accounting manipulation practices.
However, the reduction is smaller for firms that before the wave of clawback adoption have compensation structures based on short-term incentives. Besides, the same firms shift towards long-term compensation structures after the adoption. Thus, despite the possibility of clawing back past compensation, firms switch to contingent deferred compensation incentive schemes.

From the perspective of the model, the results suggest that firms that face severe manipulation incentives also face important frictions from recovering previously-awarded short-term pay. The relatively lower reduction in forecasts-meeting for firms with a higher pre-determined share of short-term incentives suggests that clawbacks have a limited ability to curb earnings manipulation in firms with weak monitoring structures.

From a policy perspective, the process of generalized clawback adoption has achieved two possible objectives of regulators. First, the estimated response of incentive compensation structures to clawback adoption suggests that shareholders reduce the incentive compensation costs associated with earnings manipulation. This reduction unambiguously increases shareholder value in the model. Second, regulators may be especially interested in reducing the frequency of earnings manipulation, for instance, to improve the allocation of capital. The empirical results suggest that clawback adoption reduces the intensity of manipulation and, for some firms, lengthens the horizon of incentive pay, although it seems a less effective tool in firms with already weak monitoring.

Anecdotal evidence hints that firms prefer to forfeit contingent long-term pay, rather than clawing back past compensation and facing enforcement issues. For instance, of the $69 million clawed back by Wells Fargo from John Stumpf, $41 million took the form of forfeited unvested compensation, while the remaining part was deducted from his pension benefits. In 2012, JP Morgan CEO Jamie Dimon also experienced the forfeiture of $11.5 million in awards, as well as other senior executives, due to the company’s restatement.\footnote{See “Wells Fargo CEO’s $41 million ranks only third among executive-pay clawbacks, forfeitures”, MarketWatch, September 29, 2016.}

### 6.2 A model of governance complementarities

The analysis in the baseline model provides predictions on the determinants and effects of clawback adoption from the perspective of an individual firm. In reality, the share of clawback adopters has increased from almost zero in the early 2000s to 85% in 2016. Importantly, this behavior happens in an environment of “soft” government regulation without mandatory compliance. Here, I explore theoretically how governance complementarities or spillovers provide a rationale for “waves” in clawback adoption. Besides, the
extensions motivate the empirical strategy of using cross-industry variation in adoption as an instrumental variable to estimate the effects of clawback adoption at the individual firm level.

Consider an economy populated by a unit continuum of identical firms that face the same agency problem as in the baseline model. Suppose that in the absence of clawbacks the manipulation problem is severe, so I let \( W = \min\{W_S, W_{L+S}\} \) denote the cost of the optimal contract in the absence of clawbacks. Similarly, I denote by \( W_C \) the cost of the optimal contract conditional on clawback adoption.

Firms decide simultaneously on the structure of incentive compensation and clawback adoption, whose enforcement cost depends on the share of firms that have adopted a clawback provision. Specifically, I assume that the cost of clawback enforcement is \( \kappa g(q) \) when a share \( q \in [0, 1] \) of firms adopt a clawback provision, where \( g(q) > 0 \) and \( g' < 0 \). I assume that \( g(0) = 1 \), so \( \kappa \) represents the clawback enforcement costs of a single adopter.

Enforcement costs may decrease with the share of adopters because, for instance, adoption by several firms may convey information about clawback enforcement being eased. Moreover, litigations with managers may be less costly or less frequent if clawback provisions represent a standard in corporate governance among peer firms. This assumption is consistent with empirical evidence of Foroughi et al. (2016) and Bouwman (2011) who find that a firm’s propensity to adopt governance provisions increases after other firms in the same board interlock network choose to adopt similar policies. Thus, spillovers are likely drivers of governance trends, such as those related to clawback adoption.\(^{33}\)

Complementarities in the choice of incentive contracts arise from the fact that adoption by one firm increases the likelihood of adoption by the remaining firms. This can give rise to a multiplicity of equilibria as follows.\(^{34}\) An individual firm adopts the clawback if the cost of adoption is below the cost of no adoption, taking \( q \) as given:

\[
W \geq W_C + \kappa g(q)
\]

\(^{33}\)In Appendix D I derive a micro-foundation for the reduced-form effect of governance spillovers. The derivations show that firms may have reasons to jointly hide information through earnings manipulation and induce the participation of stakeholders. In such situation, earnings manipulation decisions become strategic complements and multiple equilibria may arise in terms of the intensity of manipulation and clawback adoption. An alternative story is that shareholders are constrained in their governance policies by competitive pressures related to the retention of managerial talent, as in Dicks (2012) and Acharya and Volpin (2009). The trend in the data seems more consistent with firms experiencing a reduction in their costs of clawback enforcement and larger firms benefiting the most, or first, from that reduction.

\(^{34}\)Formally, the payoff function has increasing differences in other firms’ clawback adoption decision (Vives, 2005). The arguments below also follow if one assumes a discrete number of firms deciding simultaneously the clawback adoption, where \( \kappa \) is decreasing in the number of adopters.
Hence, multiple equilibria arise if the net gains of a single isolated adoption are negative, but generalized adoption at the economy level, $q = 1$, makes adoption valuable. Thus, the next proposition follows without proof.

**Proposition 7.** There exist parameter configurations with $\kappa \geq W - W_C \geq \kappa g(1)$ for which two stable Nash equilibria exist: one with no adoption, $q = 0$, and another with full adoption, $q = 1$.

The multiplicity of equilibria in terms of clawback adoption also represents multiplicity in terms of earnings manipulation if the clawback provision deters manipulation.\(^{35}\) In one equilibrium, firms adopt governance tools that deter manipulation and become legal standards with a low risk of litigation for each firm. In the other equilibrium, firms do not adopt due to enforcement costs, manipulation takes place and managers extract higher rents.

### 6.3 Complementarities and the role of firm heterogeneity

In the presence of multiple equilibria, what fundamentals can determine the early or late-adopter nature of a single firm or an industry? Clawbacks were a rare governance device before the several regulatory reforms in the US since the 2000s. Subsequently, the type of soft regulations that eased clawback enforceability may have shifted sufficiently the clawback enforcement costs to shift the equilibrium, due to complementarities, to another regime with generalized adoption.

Here I explore the effects of firm heterogeneity on the timing of clawback adoption decisions after regulations that reduce the clawback enforcement costs. Suppose that firms are heterogeneous across a dimension $\theta$ that impacts the cost of clawback enforcement and follows a distribution function $F$ on the interval $[\theta, \bar{\theta}]$. That is, assume that $\kappa(\theta)$ represents the clawback enforcement costs, for a firm of type $\theta$, with $\kappa'(\theta) > 0$. The idea is that firms are heterogeneous in the strength of their ex-post enforcement or the legal protection of managers. Therefore, clawback adoption of a type $\theta$ takes place if, for a share of adoption $q$, $W_C - \kappa(\theta)g(q) < W$. Thus, adoption is optimal at least for a share $F(\theta)$ of firms.

For illustration purposes I consider the next parameterization. Assume that $\theta \geq 0$ and $\kappa(\theta) = k_0 \theta^{k_1}$, where $k_1 > 0$ determine the importance of firm heterogeneity on the costs of clawback enforcement.\(^{36}\) Moreover, I assume that the enforcement costs decrease in

\(^{35}\)When multiple equilibria are present there is an unstable equilibrium with a partial share of adopters $\hat{q}$ that satisfies $W - W_C = \kappa g(\hat{q})$.

\(^{36}\)The specification provides equivalent results to assuming that the difference $W - W_C$ decreases proportionally to the parameter $\theta$. 

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proportion to the share of adopters, \( g(q) = 1 - q \).

Suppose that \( k_0 \) is a policy parameter that can be affected by clawback regulations. A decrease in \( k_0 \) reduces the importance of heterogeneity in clawback enforcement costs but also reduces the enforcement costs for those firms that are more likely to find adoption individually optimal. The next proposition describes how clawback regulations can affect the equilibrium outcomes and trigger an adoption wave.

**Proposition 8.** Assume that \( [1 - F(\theta)]k_0\theta^{k_1} \) is concave in \([\theta, \bar{\theta}]\). If \( k_0\theta^{k_1} \geq W - W_C \) the model has two stable equilibria: No adoption and full adoption. A change in clawback regulations that reduce \( k_0 \) to \( k'_0 \) such that \( k'_0\theta^{k_1} < W - W_C \) leads to two stable equilibria with positive shares of clawback adoption or to a single equilibrium with full adoption.

Notice that, starting from an equilibrium with no adoption, clawback regulations affect first those firms that enjoy lower firm-specific enforcement costs \( \kappa(\theta) \). Thus, cross-industry heterogeneity in the share of clawback adopters can be explained by a prevalence of firms with better ex-post enforcement structures, such as the degree of director independence. Equivalently, the argument is valid if firms are heterogeneous in terms of the direct compensation savings from clawback adoption, \( W - W_C \). That is, industry adoption will take place first in industries where firms face harsher agency problems.

### 7 Conclusions

This paper develops a theoretical model to provide a rationale for the determinants and effects of the adoption of clawback provisions that are directed to alleviate earnings manipulation problems. The model provides a stylized but general framework with three key mechanisms: (i) manipulation incentives induced by short-term compensation structures, (ii) managerial impatience that makes long-term compensation costly and (iii) clawback provisions that are costly to enforce due to litigation and have a limited recovery.

The model predicts that firms that pre-adoption face more severe agency problems and more effective ex-post detection and enforcement are also more likely to adopt a clawback provision. Besides, clawback adoption reduces earnings manipulation through two channels. First, if the recovery of compensation deters manipulation in exclusively short-term compensation contracts. Second, if shareholders find valuable to shift to party-deferred compensation structures due to limited clawback enforcement.

The implications of the model are confirmed with reduced-form evidence. Executives that embark more often in meet behavior tend to receive more incentives from short-term, vested, securities. Firm size, director independence and peer adoption are the
most relevant determinants of clawback adoption. Moreover, better _ex post_ enforcement structures, proxied by the frequency of restatements, is a relevant determinant for early adopters. Instrumental variable estimations show that clawback adoption reduces the forecasts-meeting behavior. However, the reduction is lower for firms that before the adoption rely more on short-term compensation, firms that also tilt their compensation towards the short-term. Thus, clawbacks allow firms to reduce the rent-extraction and the intensity of manipulation. Nonetheless, some firms expect a limited recovery and also a limited impact on manipulation incentives.

Additional theoretical extensions deserve further discussion. For instance, manipulation may generate real costs to shareholders in terms of reputation or lower liquidity services. These considerations can be captured in a reduced-form manner by a decrease in clawback enforcement costs and favor the clawback adoption decision. In a similar vein, shareholders may need to induce the participation of the manager against alternative outside options. Then, the choice of the optimal incentive contract is determined by the potential costs or benefits from manipulation faced by shareholders, since the expected compensation costs are pinned down by the outside opportunities of the manager. With a binding participation constraint, the criterion for the choice of optimal contracts differ. However, I conjecture that the analysis of the impact of manipulation and clawback adoption on the time structure of compensation, the focus of this paper, would remain very similar.

While the reduced-form results provide a qualitative assessment of the theoretical mechanisms and the effects of adoption, it is of quantitative relevance measuring the size of the clawback enforcement frictions and the extent of manipulation incentives. For this purpose, the theoretical model offers a suitable framework for structural estimation. A strategy that combines the structural and reduced-form approaches and that exploits the exogeneity of peer adoption may provide deeper insights in future research.

To conclude, policymakers agree on the need to regulate executive pay, but academics have not found the exact market failures that executive pay regulation may solve vis-à-vis other, and in principle more simple, regulation tools. Edmans et al. (2017b) argue that regulation that directly targets shareholder incentives or disclosure policies are more effective than outright interventions in executive pay. Further research effort must be devoted to studying these conflicting views. Moreover, cyclical increases in executive compensation provide early signals of imbalances and manipulation or misconduct at the industry and/or economy-wide level (Albuquerque et al., 2017). Thus, understanding compensation cycles and its relationship with accounting manipulation represents an interesting field for future research.
References


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Laux, Volker (2014) ‘Pay convexity, earnings manipulation, and project continuation.’ The Accounting Review 89(6), 2233–2259


Appendix

A Institutional background: The rise of clawbacks

In this Appendix, I describe the institutional background underlying the generalized adoption of clawback provisions across US publicly-traded firms. In general, clawback provisions are contractual clauses that specify the conditions under which the firm can recover previously paid-out compensation. Importantly, while shareholders can, in general, prosecute and ask for recoupment from managers that embark in misconduct, clawback provisions allow the recovery of managerial pay at a lower risk of legal disputes due to its contractual nature. Publicly-traded firms have adopted their own clawback provisions independent of any regulatory requirements. Nevertheless, these provisions have become much more common in recent years, especially after the enactment of Dodd-Frank.

Figure 3 illustrates the clawback adoption wave in the US since the year 2002. Clawback adoption is measured as the value-weighted percentage of firms within an industry
with clawbacks, i.e. it measures the share of aggregate industry value that has a clawback provision. The figure shows how adoption across industries shares a common pattern, starting in 2007, evolving to almost full adoption at the end of the period in 2016. Despite the common pattern of adoption, some cross-industry variation in the pace of adoption prevails throughout the period, with the interquartile difference being above 30%.

![Figure 3: Clawback adoption share across industries and time. Clawback adoption within an industry is measured as the value-weighted share of adopting firms. Industries are defined at the SIC 2-digit level. The bold line represents the (unweighted) average share of adoption across industries and the dashed line the median share. The shaded area represents the interquartile range. I provide the details on the construction of this database in Appendix C.]

**Sarbanes-Oxley clawback (2002)**

The US federal government’s first attempt at regulating clawbacks is section 304 of Sarbanes-Oxley Act (SOX), which enables the Securities and Exchange Commission (SEC) to require the CEO and CFO of a firm to return any bonus or other incentive-based compensation received within 12 months of an accounting restatement. The SOX clawback allows the SEC to intervene if there is some misconduct associated with the financial restatement, even without the targeted executive being at fault. The SEC has established through case law that only the SEC has the power to enforce SOX section 304. Thus, there is no private right of action.\(^{37}\) That is, shareholders must wait for the SEC to trigger the enforcement of SOX section 304.

Fried (2016) reports 14 enforcement actions— covering 21 executives— by the SEC under SOX 304. This is despite the thousands of accounting restatements taking place in that period.\(^{38}\) Thus, the SOX clawback seems a very unreliable policy to deter manip-

\(^{37}\)See In Re Digimarc Corp. Derivative Litigation, 549 F.3d 1223 (9th Cir. 2008).

\(^{38}\)In one of the enforcement actions by the SEC the former CEO of CSK Auto Corporation Maynard Jenkins had to return $2.8 million due to accounting fraud in the years 2002, 2003 and 2004 (Edmans et al., 2017b). Media coverage about SOX clawback enforcement actions appear in “Wells Fargo CEO’s
ulation. This is a likely outcome given the limited resources of the SEC, the frequency of restatements and the expensive litigation process needed to prove misconduct.

**Regulation S-K reform (2006)**

In 2006, the SEC develops new disclosure norms that require publicly-traded firms to disclose in their annual proxy statement:

“(…) policies and decisions regarding the adjustment or recovery of awards or payments if the relevant registrant performance measures upon which they are based are restated or otherwise adjusted in a manner that would reduce the size of an award or payment.”

This reform represents a first milestone in the trend of clawback adoption and disclosure across firms. Companies gradually disclosed in their proxies their ability to recover bonuses to comply with the new rules, which are incremental to SOX 304.

**TARP clawback (2009)**

In 2009, firms receiving public support through the Troubled Asset Relief Program (TARP) are required by the US government to adopt clawback provisions. The TARP clawback represents the precursor for the Dodd-Frank clawback. The misconduct or wrongdoing element in the SOX clawback is not present, and it covers parties beyond the CEO and CFO. Indeed Fried (2016) argues that the TARP clawback must be more effective since it does not require a financial restatement or the performance metrics to be based only on accounting measures.

**Dodd-Frank Act (2010)**

In the aftermath of the financial crisis, the Congress passed the Dodd-Frank Wall Street Reform and Consumer Protection Act. Title IX of the Dodd-Frank Act contains seven sections related to corporate governance issues. Section 954 in its item (b)(2) states that:

“(…) in the event that the issuer is required to prepare an accounting restatement due to the material noncompliance of the issuer with any financial reporting requirement under the securities laws, the issuer will recover from any current or former executive officer of the issuer who received incentive-based compensation (including stock options awarded as compensation) during the 3-year period preceding the date on which the issuer is required to

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41 million ranks only third among executive-pay clawbacks, forfeitures”, MarketWatch, September 29, 2016.
prepare an accounting restatement, based on the erroneous data, in excess of what would have been paid to the executive officer under the accounting restatement.”

Section 954: (i) applies to all current and former executive officers, (ii) requires only material noncompliance without misconduct, and (iii) provides for a three-year look-back. As in the case of firms covered by the TARP program, the trigger of the clawback is automatic and represents a no-fault clause. However, the Dodd-Frank clawback is restricted to financial accounting measures.

Private clawback provisions

Directors or compensation committees can privately seek the recovery of excess pay through a private clawback policy. Usually, clawback provisions specify certain behaviors, such as misconduct, financial misstatements or leaving the company to work for a competitor, that will trigger a clawback (Erkens et al., 2014). However, the frequency of director-initiated recoveries seems low. This is because almost all voluntarily-adopted clawback policies give directors discretion to forego the recovery of excess pay. Directors seem to have strong personal reasons to avoid the recovery of executive pay. In any case, anecdotal evidence suggests that recovery is forgone in many cases but clawbacks are still triggered under severe cases of misconduct, misstatements or misrepresentation.

Disclosure of clawback policies in DEF 14A proxies

Here I illustrate clawback policies, as disclosed by firms in their proxies. I stress how firms react to regulation, highlighting the discretion of boards or certain behaviors that trigger the clawback.

The next excerpt from the 2007 SPRINT Corp. proxy reports the adoption of a clawback provision. This adoption probably responds to the 2006 reform of Regulation S-K. Notice that this clawback policy provides discretion to the board of directors or its committees in the recovery decision. However, this clawback policy is not restricted to financial accounting measures.

“Clawback Policy
In December 2006, our board adopted a clawback policy. The policy provides that, in addition to any other remedies available to us under applicable law, we may recover (in whole or in part) any bonus, incentive payment, commission, equity-based award or other compensation received by certain executives, including our named executive officers, if the board or any committee of the board determines that such bonus, incentive payment, commission, equity-based award or other compensation is or was based on any financial results or
operating metrics that were impacted by the officer’s knowing or intentional fraudulent or illegal conduct, and our board or a committee of the board determines that recovery is appropriate. We intend to incorporate this policy into our short and long-term incentive plans, and awards granted under those plans, beginning in 2007.”

The following excerpt from the 2014 Coca Cola Co. proxy is representative for the clawback policies after the enactment of Dodd-Frank. It reports a wide range of situations under which compensation can be clawed back but, in particular, it stresses the case of financial misstatements. More specifically, it highlights the company’s willingness to comply with the requirements of the rulings on the Dodd-Frank clawback regulation.

“Awards under the 2014 Plan will be subject to any compensation recoupment policy that the Company may adopt from time to time that is applicable to the participant. An award agreement may specify that an award will be reduced, cancelled, forfeited or recouped upon certain events, including (i) termination of employment for cause, (ii) violation of material Company and affiliate policies, (iii) breach of noncompetition, confidentiality or other restricted covenants that may apply to the participant, (iv) other conduct by the participant that is detrimental to the business or reputation of the Company or any affiliate, (v) a later determination that the vesting of, or amount realized from, a performance award was based on materially inaccurate financial statements or performance metric criteria, whether or not the participant caused or contributed to such inaccuracy. The Company will also seek to recover any awards made as required by the provisions of the Dodd-Frank Wall Street Reform and Consumer Protection Act or any other law or the listing standards of the NYSE.”

Lastly, the following excerpt from the proxy statement of Bank of America Corporation in 2009 is an example of those firms in the TARP program.

“On February 17, 2009, the American Recovery and Reinvestment Act of 2009, which includes additional restrictions on executive compensation applicable to companies participating in the TARP, was signed into law by President Obama. This law will provide further restrictions on the amount and type of compensation we pay to our executive officers and certain other highly compensated employees; however, the details of those restrictions will not be known until the Treasury Department proposes and finalizes regulations to effectuate the law.
Recoupment Policy

In addition to the recoupment requirements described above as a result of our participation in TARP, if our Board or an appropriate Board committee has determined that any fraud or intentional misconduct by one or more executive officers caused us, directly or indirectly, to restate our financial statements, the Board or committee will take, in its sole discretion, such action as it deems necessary to remedy the misconduct and prevent its recurrence. The Board or committee may require reimbursement of any bonus or incentive compensation awarded to such officers or cancel unvested restricted stock or outstanding stock option awards previously granted to such officers in the amount by which such compensation exceeded any lower payment that would have been made based on the restated financial results.”

The Wells Fargo scandal

The development of several recent scandals manifests that policymakers, corporate governance practitioners and the public opinion consider the application of clawbacks as an important and relevant device. The Wells Fargo bogus accounts scandal illustrates this view. The anecdotal evidence highlights three issues. First, the importance of the design of incentive compensation in inducing manipulation or misconduct across all management levels of a company. Second, how compensation practices that undoubtedly lead to misbehavior can *ex-ante* be accepted by firm shareholders. Third, that the public exposure drawn by the media and policy-makers with respect to corporate scandals represent an additional force that eases clawback adoption and enforcement. This last feature is mostly relevant for bigger firms.

In the summer of 2016, it comes public that thousands of Wells Fargo employees have created 1.5 millions of unauthorized bank accounts and filed 500,000 credit card applications without customer consent since 2011 or even before. The bogus accounts earned the bank unwarranted fees, allowing Wells Fargo employees to boost their compensation through aggressive incentive schemes. Several government agencies fined Wells Fargo $185 million for this fraudulent behavior.40

The fraud appears to stem directly from the mantra of then Wells Fargo CEO John G. Stumpf: “eight is great” or get eight Wells Fargo products into the hands of each customer. Later, internal investigations find that Stumpf and Carrie L. Tolsted, chief of the community banking division, ignored clear signs of misconduct regarding the bo-

40More specifically, the Wells Fargo was fined $100 million by the Consumer Financial Protection Bureau, $50 million by the Office of the Comptroller of the Currency and $35 million by the city and county of Los Angeles.
gus accounts. After the scandal goes public, government officials and the public opinion pushed for Stumpf’s resignation and the bank board to claw back his compensation. Effectively, Wells Fargo has a clawback provision since its participation in TARP and continues disclosing this possibility in later proxy statements.

Stumpf testified before the US Congress and resigned after some resistance, while Tolsted left the company without severance pay. Moreover, the board of directors clawed back around $41 million and $19 million, respectively, from Stumpf and Tolsted’s unvested compensation. After internal investigations, in April 2017 further $47 million were clawed back from Tolsted’s compensation and $28 million were deducted from Stumpf’s pension benefits. These amounts are sizeable for both executives relative to their annual compensation. The total recovery of 69$ million for Stumpf represents four times the annual compensation in 2015. The figure increases to more than 7 times for the case of Tolsted.\(^{41}\)

In the summer of 2017, it also comes public that Wells Fargo has charged hundreds of thousands of customers for auto insurance they did not request. As a result, thousands of customers had overdrawn accounts, fees, lower credit scores, or even defaults that led to car repossessions. This has led some legal authorities to request the Federal Reserve to oust all the members of the bank’s board.\(^{42}\)

\section*{B Proofs}

\textbf{Proof of Lemma 1}

As a preliminary step, first I show that either \(w_H > 0\) or \(w_{HH} > 0\), or both. Notice that in the incentive compatibility constraint (3) the term on the right-hand side must be positive. By contradiction, if \(B/e - \gamma(m) < 0\) then \(w_H = w_L = w_{HH} = w_{HL} = w_{LL} = 0\) would be optimal. But, by condition (2), this would lead to \(m = 0\) and \(\gamma(m) = 0\). Thus, any or both of the terms that contribute positively to effort incentives, \(w_H\) and \(w_{HH}\), must be positive.

Now assume that a contract with \(w_{LL} > 0\) is optimal. Consider a new contract such that \(w'_{LL} = w_{LL} - \varepsilon\) and \(w'_{L} = w_L + \beta \varepsilon\), with \(\varepsilon > 0\) arbitrarily small. Notice that the new contract still satisfies the incentive compatibility constraint (3). Moreover, the decision \(m\)

\(^{41}\)This computation uses the imputed figure of 19,318,604 of the variable “tdc1” in Execucomp for John G. Stumpf and 9,068,586 for Carrie L. Tolsted in 2015. This variable captures the value of total executive compensation comprised of the salaries, cash bonuses, the value of equity and option awards, among other concepts. The proportions over annual salary represent an upper bound estimate on the size of the clawback since the realized value from option exercise and stock-vesting are not considered.

\(^{42}\)See “As Wells Fargo’s woes mount, its board may be on the firing line”, MarketWatch, August 9, 2017.
is unchanged with respect to the original contract from condition (2). The new contract reduces the expected compensation costs by \((1 - \epsilon)(1 - m)(1 - \beta)\epsilon > 0\) and is feasible. Thus, the original contract cannot be optimal.

Next, assume that a contract with \(w_{HL} > -c\ell(w_H - w_L)\) is optimal, for any \(c \in \{0, 1\}\). Consider a new contract such that \(w'_{HL} = w_{HL} - \epsilon\), with \(\epsilon > 0\) arbitrarily small. Consider first the case in which the decision \(m\) is unchanged with respect to the original contract through condition (2). Notice that the new contract adds slack to the incentive compatibility constraint (3). The new contract also reduces the expected compensation costs by \((1 - \epsilon)m\epsilon > 0\) and is feasible. If \(m = \overline{m}\) the reduction in expected costs is strictly positive, so the initial contract cannot be optimal. If \(m = 0\) there are no financial restatements and the payment \(w_{HL}\) is off-the-equilibrium. In that case any \(w_{HL}\) that satisfies (2) would be optimal, but I can assume that \(w_{HL} = -c\ell(w_H - w_L)\) without loss of generality.

Consider now the cases in which the reduction in \(w_{HL}\) to \(w'_{HL}\) changes the manipulation decision from \(m = \overline{m}\) to \(m = 0\). In terms of equation (2), this means that

\[
\overline{m}(w_H - w_L) + \overline{m}\beta w_{HL} > \gamma \\
\overline{m}(w_H - w_L) + \overline{m}\beta(w_{HL} - \epsilon) \leq \gamma
\]

Notice that with \(w_{LL} = 0\) the incentive compatibility constraint (3) can be rewritten as

\[
(w_H - w_L) + \beta w_{HH} - [m(w_H - w_L) + m\beta w_{HL} - \gamma(m)] \geq \frac{B}{\overline{\epsilon}}
\]

Notice that in the original contract \(m = \overline{m}\) and the term in brackets is positive. Under the new contract \(m = 0\) and \(\gamma(0) = 0\). Thus, if the original contract is incentive compatible, the new contract is incentive compatible too. Moreover, in the new contract the expected compensation costs are reduced by

\[
(1 - \epsilon)\overline{m}(w_H - w_L + w_{HL}) .
\]

This term is positive since \(w_{HL} > -(w_H - w_L)\) and \(\overline{m}(w_H - w_L) + \overline{m}\beta w_{HL} > \gamma > 0\). Thus, the new contract dominates the original one.

Similarly, consider a contract with \(w_L > 0\) and assume that it is optimal. Consider a new contract such that \(w'_{LL} = w_L - \epsilon\), with \(\epsilon > 0\) arbitrarily small. Suppose first that the decision \(m\) is unchanged with respect to the original contract through condition (2). Notice that the new contract adds slack to the incentive compatibility constraint (3).
The new contract reduces the expected compensation costs by \((1 - \varepsilon)(1 - m)\varepsilon > 0\) and is feasible. Thus, the original contract cannot be optimal.

Suppose now that the reduction in \(w_L\) to \(w'_L\) changes the manipulation decision from \(m = 0\) to \(m = \overline{m}\). Notice that, since \(w_{HL} = -c(w_H - w_L)\) and \(w_{LL} = 0\), this means that \(w_H > \frac{\gamma}{m(1 - \beta c)} + w_L - \varepsilon\). One can still design an alternative contract with \(m = 0\) by setting \(w'_H = \frac{\gamma}{m(1 - \beta c)} + w_L - \varepsilon\). Then \(w'_H - w'_L = \frac{\gamma}{m(1 - \beta c)} > 0\) implying that the new contract adds slack to the incentive compatibility constraint (3) since \(w_H - w_L \leq \frac{\gamma}{m(1 - \beta c)}\), so \(m = 0\), in the original contract. Thus, if the original contract is feasible, the new contract is also feasible. Moreover, because \(w'_H < w_H\) and \(w'_L < w_L\) the expected compensation costs in the new contract are unambiguously smaller.

Finally, the incentive compatibility constraint (3) binds. Otherwise, nodes with positive compensation, \((w_H, w_{HH})\), can be readjusted until the incentive compatibility condition binds, reducing the expected compensation costs. Moreover, a reduction in \(w_H\) can reduce \(m\) which also reduces the expected compensation costs.

**Proof of Proposition 1**

Assume that \(m = 0\). Paying with deferred compensation \(w_{HH}\) is more expensive because of managerial discounting. Formally, in the \((w_H, w_{HH})\) space the isocost curves are linear with slope \(-1\) and the (binding) incentive compatibility constraint has a slope \(-1\) in all its domain. Then, the contract that minimizes the cost of incentive compensation pays \(w_H = B/\varepsilon\) and zero elsewhere. From condition (2) the contract effectively induces no manipulation, \(m = 0\), since \(B/\varepsilon \leq \gamma/\overline{m}\).

**Proof of Proposition 2**

If \(B/\varepsilon > \gamma/\overline{m}\) shareholders cannot pay exclusively in the short-term without inducing manipulation. The incentive compatibility constraint becomes a piecewise linear function in the \((w_H, w_{HH})\) space, with slope \(-1/\beta\) for \(w_H \in [0, \gamma/\overline{m}]\) and \(-(1 - m)/\beta\) for \(w_H > \gamma/\overline{m}\). Correspondingly, the isocost curves have slopes \(-1\) and \(-\left[1 + (1 - \varepsilon)\frac{m}{\varepsilon}\right] < -1\).

Because of the linearity of the objective function and the constraints, it suffices to search for the corners of the feasible region delimited by (5) and (6) in the \((w_H, w_{HH})\) space.

Suppose that \(m = 0\) in the optimal contract. A contract with fully deferred compensation is clearly suboptimal, since some short-term compensation can be used with neither inducing manipulation nor incurring in the cost of deferrals. Shareholders will be willing to use short-term compensation up to the point where condition (5) binds. Thus, from
the incentive compatibility constraint (6), for \( m = 0 \) the optimal contract is

\[
\frac{\gamma}{m} \quad \text{and} \quad \frac{1}{\beta} \left( \frac{B}{\bar{c}} - \frac{\gamma}{m} \right) > 0.
\]

The expected cost of the contract with deferred compensation is given by

\[
\begin{align*}
W_{L+S} &= \bar{c} \frac{\gamma}{m} + \frac{1}{\beta} \left( \frac{B}{\bar{c}} - \frac{\gamma}{m} \right) \\
&= B + \frac{1 - \beta}{\beta} \left( B - \bar{c} \frac{\gamma}{m} \right).
\end{align*}
\]

The last term on the right hand side represents the excess cost for shareholders from deferring the part of compensation that would induce manipulation otherwise. The expected costs go to \( B \) as the discount rate of the manager \( \beta \) goes to 1.

The other corner, with \( m = \overline{m} \), is represented by a contract that uses fully short-term compensation and shareholders bear with the manipulation rents, \( \left( \frac{B}{1-\overline{m}}, 0 \right) \). This contract induces manipulation since \( \frac{B}{\bar{c}} \geq \frac{\gamma}{m} \) implies that \( \frac{B}{1-\overline{m}} \geq \frac{\gamma}{m} \).

The expected compensation costs for shareholders are given by

\[
W_S = \left[ \bar{c} + (1 - \bar{c}) \overline{m} \right] \frac{B}{1-\overline{m}} - \frac{\gamma}{\overline{m}}
= \left( \bar{c} + \frac{\overline{m}}{1-\overline{m}} \right) \left( \frac{B}{\bar{c}} - \frac{\gamma}{\overline{m}} \right).
\]

Can the cost of this contract be smaller or equal than \( B \)? The answer is no. Notice that \( W_S \leq B \) is equivalent to

\[
\left( \bar{c} + \frac{\overline{m}}{1-\overline{m}} \right) \frac{\gamma}{\overline{m}} \geq \frac{\overline{m}}{1-\overline{m}} \frac{B}{\bar{c}}
\]

\[
\frac{\gamma}{\overline{m}} \geq \frac{1}{\overline{m}} \frac{B}{\bar{c}}
\]

But, since \( \bar{c} \leq 1 \) the term on the right hand side of the inequality is greater than \( B/\bar{c} \), meaning that \( \gamma/\overline{m} \geq B/\bar{c} \). This contradicts with the assumption that \( B/\bar{c} > \gamma/\overline{m} \). ■

**Proof of Proposition 3**

Assume that \( B/\bar{c} \leq \frac{\gamma}{(1-\overline{m}) \overline{m}} \). This case corresponds to the case in which the incentive compatibility constraint has slope \( -1 \) in its whole domain in \( (w_H, w_{HH}) \) space. This means that shareholders can use fully short-term compensation, paying \( w_H = B/\bar{c} \) without inducing manipulation, \( m = 0 \), and without incurring in the cost of deferring compensation.
The expected cost of this contract is $B + \kappa$.

**Proof of Proposition 4**

Consider now the case where $B/e > \frac{\gamma}{(1-\beta\ell)m}$. Shareholders cannot pay exclusively in the short-term without inducing manipulation. The incentive compatibility constraint becomes a piecewise linear function in the $(w_H, w_{HH})$ space, with slope $-1/\beta$ for $w_H \in [0, \gamma/((1-\beta\ell)m)]$ and $-(1-m(1-\beta\ell))/\beta < -1$ for $w_H < \gamma/((1-\beta\ell)m)$. The isocost curves have slope $-1$ in all the domain. I analyze the two relevant corners in the feasible set following the lines of the proof to Proposition 2. On the one hand, shareholders can induce $m = 0$ by setting

$$w_H = \frac{\gamma}{(1-\beta\ell)m} \text{ and } w_{HH} = \frac{1}{\beta} \left( \frac{B}{e} - \frac{\gamma}{(1-\beta\ell)m} \right).$$

This contract has a compensation cost equal to

$$W_{C,L+S} = \bar{e}w_H + \bar{e}w_{HH} = \frac{\bar{e}\gamma}{m(1-\beta\ell)} + \frac{1}{\beta} \left( B - \frac{\bar{e}\gamma}{m(1-\beta\ell)} \right),$$

and total costs $W_{C,L+S} + \kappa$. On the other hand, the optimal contract may be located in the corner where the manager only receives short-term compensation

$$w_H = \frac{B/e - \gamma}{1-m(1-\beta\ell)} \text{ and } w_{HH} = 0$$

but under this contract the manager will manipulate, $m = m$, since $B/e > \frac{\gamma}{(1-\beta\ell)m}$. The corresponding expected compensation costs are

$$W_{C,S} = [\bar{e} + (1-\bar{e})m(1-\ell)]w_H = [\bar{e} + (1-\bar{e})m(1-\ell)]\frac{B/e - \gamma}{1-m(1-\beta\ell)} \quad (B.1)$$

and total costs $W_{C,S} + \kappa$.

**Proof of Proposition 5**

Fix $\ell = 1$. For $B/e \leq \frac{\gamma}{(1-\beta\ell)m}$ the optimality of short-term contracts arises directly from the proof of Proposition 3. For the case $B/e > \frac{\gamma}{(1-\beta\ell)m}$ we can express the compensation costs for each type of contract as

$$W_{C,S} = \bar{e} \frac{B/e - \gamma}{1-m(1-\beta\ell)}$$

$$W_{C,L+S} = \frac{\bar{e}\gamma}{m(1-\beta)} + \frac{1}{\beta} \left( B - \frac{\bar{e}\gamma}{m(1-\beta)} \right)$$

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Suppose that the partly-deferred compensation contract dominates the short-term compensation contract. Then, parameters must satisfy that

\[
\frac{\bar{e}\gamma}{m} + \frac{1}{\beta} \left( B - \frac{\bar{e}\gamma}{m} \right) \leq \frac{B - \bar{e}\gamma}{1 - \bar{m}(1 - \beta)}
\]

\[
\frac{1}{\beta} \left( B - \frac{\bar{e}\gamma}{m} \right) \leq \frac{B - \bar{e}\gamma}{1 - \bar{m}(1 - \beta)}.
\]

Rearranging the previous expression one gets to

\[
\frac{B}{\bar{e}} \leq \frac{\gamma}{(1 - \beta)m},
\]

which contradicts the initial assumption. Thus, for \( \ell = 1 \), clawback contracts only feature short-term compensation.

**Proof of Proposition 6**

First, notice that for high \( B \) and low \( \gamma \) the manipulation problem becomes severe, \( B/\bar{e} > \gamma/m \), so we must check the conditions under which \( W_S < W_{L+S} \). The difference in expected compensation costs between a short-term compensation contract and a deferred compensation contract, \( W_S - W_{L+S} \), arises from Proposition 3 and is given by the following function

\[
F(B, \gamma, \bar{e}, m, \beta) = \frac{m}{1 - m} \frac{B}{\bar{e}} - \left( \bar{e} + \frac{m}{1 - m} \right) \frac{\gamma - 1 - \beta}{\beta} \left( B - \frac{\bar{e}\gamma}{m} \right)
\]

which simplifies to

\[
F(B, \gamma, \bar{e}, m, \beta) = \frac{B}{\bar{e}} \left( \frac{m}{1 - m} - \bar{e} \frac{1 - \beta}{\beta} \right) - \left[ \frac{m}{1 - m} \left( \bar{e} + \frac{m}{1 - m} \right) - \bar{e} \frac{1 - \beta}{\beta} \right] \frac{\gamma}{m}
\]

(B.2)

The short-term contract with manipulation dominates when \( F \) is negative and the long-term compensation contract dominates otherwise. Recall that \( F \) determines the optimal incentive compensation contract only when \( B/\bar{e} > \gamma/m \).

Next, notice that the first term in parentheses in the definition of \( F \) is greater or equal than the term in brackets

\[
\frac{m}{1 - m} \geq m \left( \bar{e} + \frac{m}{1 - m} \right)
\]

\[
\frac{1}{1 - m} \geq \bar{e} + \frac{m}{1 - m}
\]

\[1 \geq \bar{e}\]
Then, since $B \gamma > m$, $F$ is negative only if the first term in parenthesis is negative, yielding

$$
\beta < \hat{\beta} = \frac{\bar{\varepsilon}}{\bar{\varepsilon} + \frac{m}{1-m}}.
$$

The comparative statics results arise from the impact of parameters on (B.2). Partial derivatives are given by

$$
\frac{\partial F}{\partial B} = \frac{1}{\bar{\varepsilon}} \left(\frac{m}{1-m} - \bar{\varepsilon} \frac{1-\beta}{\beta}\right),
$$

$$
\frac{\partial F}{\partial \gamma} = \frac{\bar{\varepsilon}}{m} \frac{1-\beta}{\beta} - \bar{\varepsilon} - \frac{m}{1-m},
$$

$$
\frac{\partial F}{\partial \beta} = \frac{\bar{\varepsilon}}{\beta^2} \left(\frac{B}{\bar{\varepsilon}} - \frac{\gamma}{m}\right).
$$

Notice that $\partial F/\partial B$ is negative for $\beta < \hat{\beta}$. Moreover, $\beta < \hat{\beta}$ implies that $\partial F/\partial \gamma$ is positive. Lastly, $\partial F/\partial \beta$ is positive for $B/\bar{\varepsilon} > \gamma/m$. The remaining partial derivatives have an ambiguous sign:

$$
\frac{\partial F}{\partial m} = \frac{B}{\bar{\varepsilon}} - \gamma \left(\frac{1}{(1-m)^2} - \frac{1-\beta}{m^2}\right),
$$

$$
\frac{\partial F}{\partial \bar{\varepsilon}} = -\gamma - \frac{m}{1-m} \frac{B}{\bar{\varepsilon}} + \frac{1-\beta}{\beta} \frac{\gamma}{m}.
$$

Determinants of clawback adoption

**Proposition B.1.** Assume that $B/\bar{\varepsilon} > \gamma/m$ and that fully short-term compensation clawback contracts deter manipulation, i.e. $B \gamma \leq \gamma (1-\beta) m$. Clawback adoption is optimal if $m$ and $B$ are high and $\kappa$, $\beta$, $\gamma$ and $\bar{\varepsilon}$ are low.

**Proof.** Suppose that $W_{L+S} > W_S$, then clawback adoption takes place if and only if $W_{L+S} \geq W_C + \kappa$, that is

$$
\kappa \leq \frac{m}{1-m} \left(\frac{B}{\bar{\varepsilon}} - \gamma\right) - \bar{\varepsilon} \gamma . \quad (B.3)
$$

Suppose that $W_S > W_{L+S}$, then clawback adoption takes place if and only if $W_S \geq W_C + \kappa$, that is

$$
\kappa \leq \frac{\bar{\varepsilon}(1-\beta)}{\beta} \left(\frac{B}{\bar{\varepsilon}} - \frac{\gamma}{m}\right) . \quad (B.4)
$$

Notice that the right-hand sides of conditions (B.3) and (B.4) increase in $B$ and $m$, which favours clawback adoption. In addition, the same terms decrease in $\beta$, $\gamma$ and $\bar{\varepsilon}$, which
goes against the adoption. The effect of $\kappa$ is immediate.

**Proof of Proposition 8**

Since $[1 - F(\theta)]k_0\theta^{k_1}$ is concave, by Weierstrass theorem it reaches a maximum and a minimum in $[\underline{\theta}, \overline{\theta}]$. Moreover, the minimum is reached in $\overline{\theta}$ and, since $W - W_C > 0$ a full share of adoption, $q = 1$, is an equilibrium. Similarly, if $k_0\theta^{k_1} > W - W_C$ firms with the lowest type $\theta$ abstain from adopting the clawback.

Then, consider the regulation change from $k_0$ to $k_0' < k_0$. Assume that the change in parameters is big enough so that the lowest firm types find clawback adoption optimal, i.e. $k_0'\theta^{k_1} \leq W - W_C$. Then, the multiplicity of equilibria persists if for $\hat{\theta} = \arg\max [1 - F(\theta)]k_0\theta^{k_1}$ we find that $k_0'\hat{\theta}^{k_1} > W - W_C$ and $\hat{\theta} > \overline{\theta}$. If it is the case the two stable equilibria consist of an interior equilibrium $\theta$ and a full-adoption equilibrium. If $k_0'\hat{\theta}^{k_1} \leq W - W_C$ the single equilibrium is a full adoption equilibrium.

**C Data appendix**

**C.1 Construction of the database**

The procedure to construct the database is as follows. I merge Execucomp with ISS data using CUSIP codes. I merge the data set with AuditAnalytics restatement information using the CIK number for each firm. Lastly, I merge the database with IBES by using the ICLINK database that allows matching IBES tickers with Compustat “permno” and “gvkey” identifiers. I express variables in real terms using the average yearly CPI index (CPIAUCSL series extracted in FRED Economic Data) and I winsorize each variable at the 1% and 99% levels for each year, except the variable “tdc1” that I winsorize at the 2% level as in Edmans et al. (2009). I define firm size in the data as the total value of the firm, computed as the stock price at the end of the fiscal year times the number of shares outstanding, plus the difference of the total value of assets and the value of common equity. Moreover, I compute CEO tenure following Taylor (2013).

Moreover, I construct a clawback adoption database through a web crawler algorithm that searches for keywords in firms’ proxy statements that are online at the SEC’s EDGAR database. I use the dataset available at [http://www.wrds.us/index.php/repository/view/25](http://www.wrds.us/index.php/repository/view/25) that provides the URL for each firm filing from 1992 to 2016 in EDGAR. I focus on DEF14A proxies to search for clawback-related keywords such as “clawback”, “recovery”, “recoupment”, “reduction”, “recapture” and several variants with connection with executive compensation. Specifically, the set of keywords are:
Whenever I find a match in any proxy statement with these keywords I denote the firm as a clawback adopter. Besides, I assume that the firm is a clawback adopter for all years after the first year in which there exists a match. I merge the clawback database with the remaining information using CIK identifiers.

C.2 Computation of the wealth-performance sensitivities

The construction of the wealth-performance sensitivities, $\Delta_{Total}$, $\Delta_{S}$ and $\Delta_{L}$, or simply “deltas”, is as follows. These measures of incentives arise from the portfolio of stock and stock options held by an executive at the end of a fiscal year. More specifically, the portfolio is composed of vested or exercisable securities— which can be liquidated at will in the short-term— and unvested securities— that belong to the executive but cannot be sold by the executive. The wealth-performance sensitivity of the vested and unvested stock is equal to the stock price, while for the stock options I use the Black-Scholes formulae, taking into account the stream of dividends.

Due to changes in the reporting rules of executive compensation, I compute the deltas separately for the periods 1993-2006 and 2006-2013. In 2006 the Securities and Exchange Commission (SEC) adopted new disclosure requirements concerning, among other items, CEO compensation. Firms had to comply with the new rules if their fiscal year ended on or after December 15th, 2006. This is why the periods overlap. Some firms’ executive compensation reports in 2006 appear in the previous reporting format according to each firm’s fiscal year-end. In the following, I discuss separately the construction of the deltas for both reporting formats. The discussion here largely overlaps the descriptions in Coles et al. (2013) and Edmans et al. (2009). Variables within quotes denote those variables that are available in Execucomp.

For the new reporting format, Execucomp provides a separate record for each outstanding option tranche (denoted by a different value of “outawdnum”), indicating the number of vested, unvested, and unearned options of each tranche, and their correspond-
ing exercise price and expiration date. In order to compute the Black-Scholes value of options I need the exercise price and expiration date of the option tranche and estimates of the dividend yield, the volatility of the firm stock and the risk-free rate of return.

Execucomp stopped providing the estimate of the stock return volatility, through the variable “bs_volatility”, as of 2006. I follow the Execucomp methodology as closely as possible. Accordingly, I (i) use the annualized standard deviation of (log) stock returns estimated over the 60 months prior to the beginning of each fiscal year; (ii) require at least 12 months of returns data; (iii) use mean volatility (across all firms) for that year if 12 months of data are not available; and (iv) winsorize the volatility estimates at the 5th and 95th levels. The Black-Scholes volatility is denoted by $bs_{volit}$.

I also compute estimates of the dividend yield because Execucomp stopped providing this variable, “bs_yield”, as of 2006. Following their methodology as closely as possible: I (i) use the average of “divyield” provided by Compustat/CRSP over the current year and the two prior years and (ii) winsorize the values at the 5th and 95th levels. The “divyield” is expressed as a percentage in Execucomp and I divide by 100 to use it in the Black-Scholes formula. The dividend yield is denoted by $bs_{divyit}$.

I impute the risk-free rate of return as that corresponding to the (rounded) maturity of the options as of fiscal year-end. The risk-free rate is obtained from historical data provided by the Federal Reserve on their website for “Treasury constant maturities” using the “annual” series: (https://www.federalreserve.gov/datadownload/Build.aspx?rel=H15). The website provides data for 1, 2, 3, 5, 7, and 10 year Treasury securities. I interpolate the rates to obtain the risk-free rates for 4, 6, 8, and 9 years. If the option maturity is more than 10 years, I use the 10-year rate. The rates are expressed as a percentage and divided by 100 to use them in the Black-Scholes formula. I denote this variable with the name $r_{jit}$.

I define the deltas of the options by the change in the value of the option after a percent increase in stock price:

$$\Delta_{Options} = \text{prccf} \times e^{-bs_{divy} \times t2m} \Phi \left( \ln \left( \frac{\text{prccf}}{\text{expric}} \right) + t2m \times \frac{r - bs_{divy} + \frac{bs_{vol}^2}{2}}{bs_{vol} \times \sqrt{t2m}} \right)$$

where $\Phi(.)$ denotes the cdf of a standard normal random variable, “prccf” is the fiscal year-end stock price, “expric” is the exercise price of the option tranche and $t2m$ denotes the time-to-maturity. Thus, I compute the delta of vested options, the short-term delta, by multiplying the delta of each tranch by the number of exercisable options and summing.
across all tranches:

$$\Delta_{S, \text{Options}}^{\text{new}} = \sum_j \Delta_{\text{Options}, j} \times \text{"opts\_unex\_exer"}_j$$

Similarly, for unvested options:

$$\Delta_{L, \text{Options}}^{\text{new}} = \sum_j \Delta_{\text{Options}, j} \times \text{"opts\_unex\_unexer"}_j$$

Whenever these values give a negative number I set them to zero.

With respect to the old reporting format, firms were required to report tranche level details only for the current year’s option grants. That is, we have the number of options granted “numsecur”, the exercise price “explic”, and the maturity of each tranche of options awarded in the current year “exdate”. With this information I just need the variables bs_vol and bs_divy to compute the delta of the options, which I denote by deltanew.

In contrast, firms were not required to report tranche-level details on previously granted options. Instead, they only had to report the intrinsic value and number separately for the portfolio of vested options and the portfolio of unvested options. For unvested options, the exercise price is given by

$$\text{strike}_\text{un} = \text{"prccf"} - \frac{\max(0, \text{"opt\_unex\_unexer\_est\_val"} - \text{ivnew})}{\text{"opt\_unex\_unexer\_num"} - \text{numnewop}}$$

Where ivnew is the intrinsic value of the newly-granted options, \((P - \text{expirc})^+ \times \text{numsecur}\), and numnewop is the total number of newly granted options, “numsecur”. The deduction of ivnew and numnewop in the expression above arises from the fact that nearly all newly granted options are always exercisable. However, if numnewop ≥ “opt\_unex\_unexer\_num” + “opt\_unex\_exer\_num” the number of new options exceed the number of options held at the end of the fiscal year. In that case, all options are assumed to be newly granted, setting deltanew to zero. Thus, I assume that there are “opt\_unex\_unexer\_num” options with strike price

$$\text{strike}_\text{un} = \text{"prccf"} - \frac{\text{"opt\_unex\_unexer\_est\_val"}}{\text{"opt\_unex\_unexer\_num"}}$$

If “opt\_unex\_unexer\_num” ≤ numnewop < “opt\_unex\_unexer\_num” + “opt\_unex\_exer\_num” the number of newly granted options exceeds that of unexercisable options at year end, but is less than total option. In this case I assume that there are no additional pre-existing unvested options and new grants of numnewop - “opt\_unex\_unexer\_num” exercisable options.
For vested options, similar reasoning gives rise to the following strike price:

\[
\text{strike}_\text{ex} = \text{prccf} - \frac{\text{max}(0, \text{opt_unex_exer_est_val}) - \text{max}(0, \text{ivnew} - \text{opt_unex_unexer_est_val})}{\text{opt_unex_exer_num}} - (\text{numnewop} - \text{opt_unex_unexer_num})
\]

For the option maturities, I assume a maturity for existing unexercisable options of one year less than the maturity of newly granted options—I consider the longest maturity option if there are multiple grants. If there were no new grants, I set it to 9.5 years. The maturity of exercisable options is assumed to be three years less than for unexercisable options. I multiply the maturities of all options by 70 per cent to capture the fact that CEOs typically exercise options prior to maturity. If the estimated maturity is negative, I assume a maturity of one day. Using the estimated maturities and exercise prices of vested options then I can compute their Black-Scholes deltas, \( \Delta_{\text{Options,ex}} \) for exercisable options and \( \Delta_{\text{Options,un}} \) for unexercisable options. For that means, I use the estimated volatilities and dividend yields, together with the risk-free returns, as explained above for the new reporting framework. Therefore, the incentives arising from each type of options are given by \( \text{delta}_\text{ex} \) and \( \text{delta}_\text{ex} \), defined by

\[
\text{delta}_\text{ex} = \text{numexop} \times \Delta_{\text{Options,ex}}
\]
\[
\text{delta}_\text{un} = \text{max}(0, \text{opt_unex_unexer_num} - \text{numnewop}) \times \Delta_{\text{Options,un}}
\]

where

\[
\text{numexop} = \text{max}(0, (\text{opt_unex_exer_num} - \text{max}(0, \text{numnewop} - \text{opt_unex_unexer_num})))
\]

The short-term and long-term deltas arising from an executive’s option holdings are, respectively, given by

\[
\Delta_{S,\text{Option}}^{\text{old}} = \text{delta}_\text{ex}
\]
\[
\Delta_{L,\text{Option}}^{\text{old}} = \text{deltanew} + \text{delta}_\text{un}
\]

I compute the deltas of the stock portfolio as follows for both reporting formats. The number of unvested shares held by the executive are given by “stock_unvest_num”, while I compute the number of vested shares by the difference between “shrown_excl_opts” and “stock_unvest_num”, setting it to zero whenever it returns a negative number. Thus, the short-term and long-term deltas arising from an executive’s holdings of stock are, respectively, given by

\[
\Delta_{S,\text{Stock}} = \text{“stock_unvest_num”} \times \text{“prccf”}
\]
\[
\Delta_{L,\text{Stock}} = (\text{“shrown_excl_opts”} - \text{“stock_unvest_num”}) \times \text{“prccf”}
\]

Since Execucomp reports the number of securities in thousands I divide all the measures
by 1000, thus measures of incentives represent the increase in an executive’s wealth in millions of dollars after a one per cent increase in shareholders value. The resulting measures that I use in the estimations are

\[
\Delta^\text{old}_S = (\Delta_{S,\text{Stock}} + \text{delta}_{\text{ex}}) / 1000
\]

\[
\Delta^\text{old}_L = (\Delta_{L,\text{Stock}} + \text{deltanew} + \text{delta}_{\text{un}}) / 1000
\]

for the old reporting format, with \(\Delta^\text{old}_{\text{Total}} = \Delta^\text{old}_S + \Delta^\text{old}_L\). Similarly, for the new reporting format I compute

\[
\Delta^\text{new}_S = (\Delta_{S,\text{Stock}} + \Delta^\text{new}_{S,\text{Options}}) / 1000
\]

\[
\Delta^\text{new}_L = (\Delta_{L,\text{Stock}} + \Delta^\text{new}_{L,\text{Options}}) / 1000
\]

and \(\Delta^\text{new}_{\text{Total}} = \Delta^\text{new}_S + \Delta^\text{new}_L\).

C.3 Manipulation and the time structure of executive pay

In this appendix first I show results from descriptive univariate tests for forecasts-meeting and restate behavior. Then, I motivate the empirical specification of equation (9) from the results in the theoretical model and present several robustness tests on the relationship between meet behavior and the structure of executives’ incentives.

**Variable definitions.** Meet takes a value of one if a firm announces earnings in a $0.01 distance from the median analysts’ forecasts and zero otherwise. Restate takes a value of one if a firm restates earnings and zero otherwise. Loss takes a value of one if a firm announces negative earnings and zero otherwise. \(\ln(1 + \text{Forecast disp.})\) is the log of the average dispersion of earnings forecasts for each earnings announcement. Big4 takes a value of one if the audit firm is a Big 4 firm and zero otherwise. \(\ln(\text{Firm value})\) is the log of total firm value computed as in Edmans et al. (2009). Independent directors is the number of independent directors on the board. \(\ln(\Delta_{\text{Total}})\) is the log of the wealth-performance sensitivity. \(\Delta_S / \Delta_{\text{Total}}\) is the ratio of short-term, vested, incentives over total incentives. \(\ln(\text{Total pay})\) is the log of item “tdc1” in Execucomp. CEO tenure is the number of years that the current CEO of the firm has been in office.

**Descriptive statistics, meet behavior and univariate tests.** Table 4 reports that meet behavior is associated with more frequent restatements, less frequent reports of losses, lower reported earnings and lower forecasts dispersion. Executives that exhibit meet behavior receive steeper incentives, higher \(\Delta_{\text{Total}}\), receive relatively more short-term incentives but lower total compensation. Similar implications follow from restatement behavior, the exception being that restating firms are smaller but executives still receive relatively more
short-term incentives.

### Table 4: Meet and restatement behavior: Univariate tests

<table>
<thead>
<tr>
<th></th>
<th>Meet</th>
<th></th>
<th></th>
<th>Restatement</th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>1</td>
<td>Difference</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Meet</td>
<td>0</td>
<td>0.28</td>
<td>0.32</td>
<td>-0.04***</td>
<td>0</td>
<td>0.05</td>
</tr>
<tr>
<td>Restate</td>
<td>0.13</td>
<td>0.04</td>
<td>0.07***</td>
<td></td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Loss</td>
<td>1.67</td>
<td>0.38***</td>
<td></td>
<td></td>
<td>1.59</td>
<td>1.32</td>
</tr>
<tr>
<td>Reported earnings</td>
<td>0.10</td>
<td>0.04</td>
<td>0.07***</td>
<td></td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Ln(1+Forecast disp)</td>
<td>2.13</td>
<td>0.13</td>
<td>0.16</td>
<td>-0.02***</td>
<td>2.18</td>
<td>2.13</td>
</tr>
<tr>
<td>Ln(Analysts)</td>
<td>0.93</td>
<td>0.00</td>
<td>0.92</td>
<td>-0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Big4</td>
<td>0.93</td>
<td>0.03</td>
<td>0.92</td>
<td>-0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ln(Firm value)</td>
<td>15.00</td>
<td>0.03</td>
<td>14.93</td>
<td>14.75</td>
<td>0.18***</td>
<td></td>
</tr>
<tr>
<td>Ln(Audit fees)</td>
<td>14.32</td>
<td>0.23***</td>
<td>14.24</td>
<td>14.13</td>
<td>0.11***</td>
<td></td>
</tr>
<tr>
<td>Independent directors</td>
<td>7.31</td>
<td>7.10</td>
<td>0.22***</td>
<td></td>
<td>7.20</td>
<td>7.00</td>
</tr>
<tr>
<td>Ln(ΔTotal)</td>
<td>1.38</td>
<td>1.65</td>
<td>-0.27***</td>
<td></td>
<td>1.31</td>
<td>1.27</td>
</tr>
<tr>
<td>ΔS/ΔTotal</td>
<td>0.61</td>
<td>0.64</td>
<td>-0.03***</td>
<td></td>
<td>0.61</td>
<td>0.63</td>
</tr>
<tr>
<td>Ln(ΔS)</td>
<td>0.81</td>
<td>1.15</td>
<td>-0.34***</td>
<td></td>
<td>0.75</td>
<td>0.74</td>
</tr>
<tr>
<td>Ln(ΔL)</td>
<td>0.13</td>
<td>0.30</td>
<td>-0.18***</td>
<td></td>
<td>0.07</td>
<td>-0.10</td>
</tr>
<tr>
<td>Ln(Total pay)</td>
<td>7.28</td>
<td>7.21</td>
<td>0.07***</td>
<td></td>
<td>7.22</td>
<td>7.05</td>
</tr>
<tr>
<td>CEO tenure</td>
<td>8.44</td>
<td>8.79</td>
<td>-0.35**</td>
<td></td>
<td>8.20</td>
<td>8.24</td>
</tr>
<tr>
<td>CEO turnover</td>
<td>0.08</td>
<td>0.08</td>
<td>0.01</td>
<td></td>
<td>0.09</td>
<td>0.08</td>
</tr>
</tbody>
</table>

This table reports the results from univariate mean tests across the sample of meet and restatement behavior in the 2002-2016 period. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Motivation for specification (9). Let $I_L$ denote the use of deferred compensation contracts and $I_S$ the use of short-term compensation contracts with manipulation. Then, using the results in Propositions 1 and 2 and interpreting the expression for $w_H$ as the short-term delta we can write $\Delta_S$ as:

$$\Delta_S = \frac{B}{\varepsilon} - I_L \left( \frac{B}{\varepsilon} - \frac{\gamma}{m} \right) + I_S \frac{m B}{1 - m} \left( \frac{B}{\varepsilon} - \frac{\gamma}{m} \right).$$

Following Gabaix and Landier (2008) I specify that $B/\varepsilon = b_0 Size^{b_1}$, where $b_0$ and $b_1$ are constants. Moreover, I assume an specification of the form $\gamma/m = b_0 Size^{b_1} g(X)$, where $g(X)$ is a function of observable and unobservable firm characteristics with $g(X) \in (0, 1)$. 

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Then, I re-express $\Delta S$ as

$$\Delta S = b_0 \text{Size}^{b_1} \left\{ 1 - I_L(1 - g(X)) + I_S \left( \frac{m}{1 - m} [1 - g(X)] \right) \right\}.$$ 

Thus, we can express the log of $\Delta S$ as

$$\ln(\Delta S) = \ln(b_0) + b_1 \ln(\text{Size}) + I_L \ln(g(X)) + I_S \ln \left( 1 + \frac{m}{1 - m} [1 - g(X)] \right).$$

The last expression and the empirical results suggest an estimable equation of the form:

$$\ln(\Delta S) = \beta_0 + \beta_1 \ln(\text{Size}) + M(X, \Theta) + \zeta$$

where $M(X, \Theta)$ is a function of observable and unobservable characteristics $X$ and the set of model parameters $\Theta$, and $\zeta$ is an error term. The function $M(X, \Theta)$ captures the increase in the performance sensitivity of short-term compensation due to the manipulation incentives. Positing a linear specification for $M(X, \Theta)$ the specification in (9) follows. Importantly, the results on optimal contracts with clawback adoption imply that the term $M$ decreases in the presence of a clawback provision since the cost difference between partly-deferred and short-term compensation contracts decreases.

Robustness tests for the relationship between meet behavior and executives’ incentives. Table 5 shows that the results in Table 1 are also robust to using $\Delta S/\Delta \text{Total}$ as a dependent variable.

C.4 Testing for misclassification of clawback adopters

I perform several robustness tests to find potential misclassification issues in the web crawler algorithm that I use to identify clawback adoption. Two types of errors can arise. First, a type I error classifies as non-adopters some firms that are actually adopters. This error arises if firms refer to clawbacks using another set of words than those that I pre-select. Second, a type II error arises if firms refer to clawback-related words without actual adoption.

I test the robustness of the search algorithm by performing estimations that explicitly consider exogenous misclassification as in Hausman et al. (1998). Letting $\alpha_I$ denote the probability of Type-I error and $\alpha_{II}$ the probability of Type-II error, the probability of identifying a firm $i$ as clawback adopter at time $t$ is given by

$$Pr(Adoption|X_{it}) = \alpha_{II} + (1 - \alpha_{II} - \alpha_I) F(A'X_{it})$$
Table 5: Dependent variable: $\Delta \frac{S}{\Delta T_{otal}}$

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ln(Firm value)</td>
<td>-1.66***</td>
<td>-1.62***</td>
<td>-1.62***</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>(0.33)</td>
<td>(0.34)</td>
<td>(0.34)</td>
<td>(0.77)</td>
</tr>
<tr>
<td>Meet Freq</td>
<td>8.86***</td>
<td>6.93***</td>
<td>6.91***</td>
<td>7.04***</td>
</tr>
<tr>
<td></td>
<td>(1.07)</td>
<td>(1.11)</td>
<td>(1.12)</td>
<td>(0.87)</td>
</tr>
<tr>
<td>Reported earnings</td>
<td>0.98***</td>
<td>1.19***</td>
<td>1.18***</td>
<td>1.15***</td>
</tr>
<tr>
<td></td>
<td>(0.24)</td>
<td>(0.24)</td>
<td>(0.25)</td>
<td>(0.33)</td>
</tr>
<tr>
<td>Ln(1+Forecast disp)</td>
<td>-29.07***</td>
<td>-29.06***</td>
<td>-52.96***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5.11)</td>
<td>(5.11)</td>
<td>(10.03)</td>
<td></td>
</tr>
<tr>
<td>Restate Freq</td>
<td>-1.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(1.98)</td>
</tr>
<tr>
<td>Constant</td>
<td>91.40***</td>
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<td>93.00***</td>
<td>69.62***</td>
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<td></td>
<td>(4.61)</td>
<td>(4.84)</td>
<td>(4.81)</td>
<td>(11.18)</td>
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<td>Observations</td>
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<td>54927</td>
<td>54927</td>
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</tr>
<tr>
<td>Adjusted $R^2$</td>
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<td>0.09</td>
<td>0.09</td>
<td>0.06</td>
</tr>
<tr>
<td>Year FE</td>
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<td>Yes</td>
<td>Yes</td>
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</tr>
<tr>
<td>Industry FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Firm FE</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

This table reports results from estimations of equation (9) for executive-firm level observations for the period 2002-2016. The dependent variable is the percentage of total executive incentives arising from vested securities. Standard errors clustered at the 2-digit SIC industry level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. 

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where \( F(.) \) is logistic, \( X_u \) are firm-time explanatory variables and the vector \( \Lambda, \alpha_I \) and \( \alpha_{II} \) represent parameters to estimate. I report the results from different specifications in Table 6, where I perform the estimations by non-linear least squares. The first two columns report baseline estimations without misclassification that are similar to the logit estimations in the first column in Table 2 in the main text.

The results in the third and fourth columns of Table 6 highlight the importance of peer effects in explaining the clawback adoption decision. The third column reports the estimation results allowing for exogenous misclassification without controlling for peer adoption. The results display that a 57\% chance of classifying an adopter as a non-adopter. Such level of misclassification disappears when peer adoption is included as an explanatory variable. This means that the 57\% figure arises from the fact that non-adopters in the early periods of the clawback adoption wave share the same characteristics of adopters in later periods. Thus, peer adoption represents an important force triggering adoption.

The estimation results in the third column of Table 6 report a small degree of Type-II misclassification error. As in the case of Type-I errors, the estimated Type-II errors disappear when peer adoption is included in the estimation. However, the predictive power of peer adoption may shadow the effect of firm-specific variables and provide a misleading interpretation of the estimation of Type-II errors. Thus, the 1\% estimate in the third column represents a useful benchmark to consider the possibility of Type-II misclassification errors.

The estimation results suggest that such cases are limited. In any case, I identify several examples of Type-II errors whereby firms cite in their proxies the possibility of clawback adoption but stress that the adoption is postponed until the SEC develops the Dodd-Frank clawback regulations. This is, for instance, the case of the 2014 proxy of Analog Devices Inc.

"Compensation Recovery"

Under the Sarbanes-Oxley Act, in the event of misconduct that results in a financial restatement that would have reduced a previously paid incentive amount, we can recoup those improper payments from our Chief Executive Officer and Chief Financial Officer. We expect to implement a clawback policy in accordance with the requirements of the Dodd-Frank Act and the regulations that will be issued under that Act. We have elected to wait until the SEC issues guidance regarding the proper form of a clawback policy in order to ensure that we implement a fully compliant policy, rather than
implementing a policy that may require significant amendment after the SEC regulations are released.”

However, this type of cases seems to be a few and a non-representative subsample of the population of public firms.

<table>
<thead>
<tr>
<th>Table 6: Missclassification of clawback adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Benchmark</td>
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<tr>
<td>Ln(Firm value)</td>
</tr>
<tr>
<td>(0.03)</td>
</tr>
<tr>
<td>Independent directors</td>
</tr>
<tr>
<td>(0.03)</td>
</tr>
<tr>
<td>CEO tenure</td>
</tr>
<tr>
<td>(0.01)</td>
</tr>
<tr>
<td>Big4</td>
</tr>
<tr>
<td>(0.12)</td>
</tr>
<tr>
<td>Meet Freq</td>
</tr>
<tr>
<td>(0.13)</td>
</tr>
<tr>
<td>Restatement Freq</td>
</tr>
<tr>
<td>(0.23)</td>
</tr>
<tr>
<td>Loss Freq</td>
</tr>
<tr>
<td>(0.33)</td>
</tr>
<tr>
<td>Industry adoption (SIC2)</td>
</tr>
<tr>
<td>(0.00)</td>
</tr>
</tbody>
</table>

Missclassification

| α1 | 0.57 | 0 |
| (0.03) | (0) |
| α11 | 0.01 | 0 |
| (0.001) | (0) |

Observations | 12773 | 12773 | 12773 | 12773 |

Adjusted R² | 0.15 | 0.16 | 0.15 | 0.16 |

Year FE | Yes | Yes | Yes | Yes |

Industry FE | Yes | Yes | Yes | Yes |

Standard errors clustered at the 2-digit SIC industry level in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01

D Further extensions

D.1 Manipulation and costly deferrals: An explicit model

Here I provide a micro-foundation for β < 1 that links the manipulation incentives of managers and the costs for shareholders of retaining talent. More specifically, I show how shareholders may be interested in inducing the manager to manipulate, so that outsiders receive a noisier signal about managerial talent, reducing their willingness to attract the
manager. Therefore, shareholders can reduce the cost of managerial retention after the earnings announcement. This mechanism is reminiscent of the signal-jamming models of Stein (1988, 1989).

Furthermore, the model provides an additional argument for the unenforceability of clawbacks based on managerial retention constraints. The mechanisms that I highlight here are more likely to be relevant in small, high-tech and high-growth firms where shareholders prefer to “hide” for some time the actual value of their investments in order to avoid outside interference.

Consider the following modification to the baseline model with $\beta = 1$. As in Holmström (1999), the manager has some talent $\eta$ that enhances the probability of the firm obtaining high cash flows under managerial effort. The manager can be talented or not. At $t = 0$ the probability that the manager is talented is assessed to be $\eta$ by shareholders as well as the manager and outsiders. If the manager is talented the probability of high cash flows under managerial effort is $e^+$, otherwise the probability of high cash flows under managerial effort is $e^-$, with $e^+ > e^-$. Therefore, the prior probability of high cash flows under managerial effort can be written as $\overline{\varepsilon} = \eta e^+ + (1 - \eta) e^-$, as in the baseline model.

The arrival of information through earnings at $t = 1$ allows all agents to update their assessment about the manager’s talent. In particular, outsiders are willing to pay $v^+$ if the manager is talented and $v^-$ otherwise. By Bayes’ rule the posterior probability about the manager’s talent after a high earnings announcement $x_H$ is given by

$$\eta_H(m) = \frac{e^+ + (1 - e^+)m}{\overline{\varepsilon} + (1 - \overline{\varepsilon})m} \eta$$

Thus, conditional on an announcement $x_H$ at $t = 1$ the manager can leave the firm and enjoy an outside option of value $v(m) = \eta_H(m)v^+ + (1 - \eta_H(m))v^-$. $\eta_H(m)$ is decreasing in $m$ since $e^+ > e^-$, i.e. manipulation reduces the effectiveness of learning about managerial talent. Hence, the manager’s outside option is also decreasing in $m$, $v(m) < v(0)$ (Gao and Zhang, 2016, Makarov and Plantin, 2015).43

The manager’s human capital is unalienable, meaning that shareholders can only obtain the final cash flows $y$ if the manager is retained at $t = 1$. Thus, the optimal contract

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43For simplicity, I assume that after an announcement of low earnings $x_L$ there are no outside opportunities for the manager and stays in the firm until $t = 2$. It would be immediate to include this possibility but it is not necessary to highlight the theoretical mechanism.
must satisfy, on top of conditions (5) and (6), the retention condition
\[ w_H + w_{HH} \geq v(m) \]

where \( m \) is anticipated by outsiders as determined by condition (5). The next proposition shows that there exists a mapping between the baseline model and the modified model with the managerial retention problem. Since retention is costly, short-term compensation has the relative advantage of making retention less expensive.\(^{45}\)

**Proposition D.1.** Assume that \( v(0) > \frac{B}{\bar{\tau}} > \frac{\gamma}{m} \) and \( \frac{B}{\bar{\tau}} > v(m) \). There exists a mapping between the model with managerial retention and the benchmark model with \( \beta' < 1 \) defined as

\[ \beta' = \frac{B/\bar{\tau} - \gamma/m}{v(0) - \gamma/m} \]

The candidate optimal contract configurations are fully short-term or partly long-term and both configurations are cost-equivalent to those in the baseline model.

**Proof.** First, notice that the incentive compatibility constraint has slope \(-1\) for \( w_H \in [0, \gamma/m] \) and \( -(1 - m) > -1 \) for \( w_H > \gamma/m \). Correspondingly, the isocost curves have slopes \(-1\) and \( -[1+(1-\tau)\frac{m}{m}] < -1 \). Since \( v(0) > \frac{B}{\bar{\tau}} \) the retention constraint will always bind when \( m = 0 \) — or equivalently when \( w_H \in [0, \gamma/m] \) — and the optimal contract will have a partly long-term structure with

\[ w_H \in [0, \gamma/m] \text{ and } w_{HH} = v(0) - w_H \]

or an exclusively short-term structure with

\[ w_H = \frac{B/\bar{\tau} - \gamma}{1 - m} \text{ and } w_{HH} = 0 \] .

Thus the modified model with \( \beta = 1 \) yields the cost-equivalent outcomes to the benchmark model, where \( \beta' \) is defined by the equality of the cost of a long-term compensation contract and the contract with retention:

\[ \tau v(0) = B + \frac{1 - \beta'}{\beta'} \left( B - \frac{\tau \gamma}{m} \right) \] .

\(^{44}\)Once the manager observes privately the realization of cash flows at \( t = 1 \) there is asymmetric information about the manager’s talent perceptions. In any case, a manager that manipulates will always replicate the actions of a manager that does not manipulate. Otherwise, the manipulation would be uncovered and shareholders would withdraw the short-term compensation \( w_H \) and outsiders would not be willing to pay \( v(m) \).

\(^{45}\)The results in Lemma 1 follow without loss in this version of the model.
Shareholders may optimally generate noise in short-term performance measures to reduce the cost of retaining a talented manager, tolerating the costs associated with manipulation. Thus, the extended model represents a reparametrization of the benchmark model. The costs of deferrals arise from the retention cost in case of no manipulation, \( v(0) \), instead of the manager’s time preferences.

What are the implications for clawback adoption? With \( \beta = 1 \) and perfect clawback recovery a clawback contract always deters manipulation. However, the compensation costs of a manager that does not manipulate are determined by \( v(0) \), so adoption will not be translated into lower costs of incentive compensation. Recall also that clawback enforcement implies a cost \( \kappa \) for shareholders. Thus, clawback adoption will increase the total costs for shareholders, whatever is the optimal compensation structure in the absence of clawback. This has the same effect of assuming that clawbacks are unenforceable, where the mechanism underlying the unenforceability is the existence of interim competitive pressures for managerial talent.

D.2 Stakeholders, industry performance and clawback adoption

Here I explore and provide a micro-foundation for the reduced-form spillovers considered in the main text. In this extension, I show that shareholders may abstain from adopting clawbacks when earnings announcements alter the perception of outsiders about the profitability of an industry. Since spillovers can explain the clawback unenforceability I assume that the reduced-form enforcement costs are zero, \( \kappa = 0 \).

Consider the game played by two identical firms \( i \) and \( j \) in a given industry that face the same agency problem as in the baseline model and simultaneously choose their compensation contracts. Suppose that the distribution of cash flows for the individual firm depends on the realization of an industry state denoted by \( s \). In particular, if the state of the industry is good, \( s = g \), firms obtain high cash flows \( y_H \) with certainty, and if the state is bad, \( s = b \), the probability of high cash flows is \( e^b < 1 \). The state of the industry is unknown, but all agents assess the probability of the good state as being \( \pi \) at \( t = 0 \). Thus, we can define \( \tau = \pi + (1 - \pi)e^b \) as in the baseline model.

Following Almazan et al. (2009) the individual firm can enhance their profitability with the participation of a stakeholder— for instance, a supplier or technological partner— that provides some fixed extra cash flows \( \Delta y > 0 \) to the firm. However, the value of participation for the stakeholder depends on the state of the industry. Specifically, stakeholders make a unit investment at \( t = 1 \) and obtain a value \( v_g > 1 \) if the industry is in a good state and \( v_b < 1 \) otherwise. For instance, collaboration with certain suppliers may
allow the firm to exploit economies of scope, while suppliers may increase their reputation from serving successful industries.

Importantly, the assessment of stakeholders about the state of the industry at \( t = 1 \)—and thus, their participation—depends on both firms’ simultaneous earnings announcements. In the good state all firms announce earnings equal to \( x_H \), so an announcement \( x_L \) by any firm reveals the bad state, in which case stakeholders refuse to participate, \( v_b < 1 \).

In contrast, participation may have positive value for stakeholders when both firms announce high earnings, no matter the degree of earnings manipulation by managers.\(^{46}\) To explore this possibility, let \( Pr(x_H, x_H|m_i, m_j) \) denote the probability of both firms announcing high earnings given the managerial manipulation decisions \((m_i, m_j)\). Thus, we have that

\[
Pr(x_H, x_H|m_i, m_j) = \pi + \left[ \bar{e}_b + (1 - \bar{e}_b)m_j \right] \left[ \bar{e}_b + (1 - \bar{e}_b)m_j \right](1 - \pi)
\]

which is increasing in firm \( i \)'s managerial manipulation decision \( m_i \) and has positive cross-derivative with respect to firm \( j \)'s managerial manipulation \( m_j \). Let \( \pi_{HH}(m_j, m_i) \) denote the posterior probability of the industry being in the good state, given earnings announcements \((x_H, x_H)\) and manipulation decisions by managers \((m_i, m_j)\). By Bayes’ rule \( \pi_{HH}(m_j, m_i) \) is defined as

\[
\pi_{HH}(m_j, m_i) = \frac{\pi}{\pi + \left[ \bar{e}_b + (1 - \bar{e}_b)m_j \right] \left[ \bar{e}_b + (1 - \bar{e}_b)m_j \right](1 - \pi)}
\]

Hence, participation by the stakeholder after announcements \((x_H, x_H)\) requires that

\[
\pi_{HH}(\bar{m}, \bar{m})v_g + [1 - \pi_{HH}(\bar{m}, \bar{m})]v_b > 1 .
\]

(D.1)

This means that the information distortions generated by manipulation are small or that the gains of participation for the stakeholder are high enough, \( v_g \) and \( v_b \) are high.\(^{47}\) Therefore, if the stakeholder participates and the manager exerts effort the expected cash flows for the individual firm are given by

\[
\bar{e}y_H + (1 - \bar{e})y_L + Pr(x_H, x_H|m_i, m_j)\Delta y
\]

Positive strategic complementarities in the level of managerial manipulation appear, since

\(^{46}\)The theoretical mechanism is similar to Rajan (1994) and Rotemberg and Scharfstein (1990). Freeman and Tse (1992) document that earnings announcements provide information about the performance of firms in the same industry. See also Thomas and Zhang (2008) and Savor and Wilson (2016).

\(^{47}\)\( \pi_{HH}(m_i, m_j) \) is decreasing in both of its arguments. Therefore, the condition above is sufficient for the participation of the stakeholder when there is no manipulation by either one firm or both.
the last term is increasing in the own managerial manipulation by the manager and has a positive cross-derivative with respect to the manipulation in the other firm. That is, if shareholders in firm $i$ allow its manager to manipulate, shareholders in firm $j$ have more incentives to do so, and vice versa. This is because both firms benefit from retaining the stakeholder in the bad state. The gains from stakeholder participation may discourage the adoption of a clawback provision that removes manipulation, despite the reduction in managerial compensation. The next proposition, analogous to the results in Proposition 7, follows.\footnote{The structure of the incentive compensation contracts is unchanged. This is because the other firm's earnings announcements are uninformative about the effort or manipulation decision of the individual manager.}

**Proposition D.2.** Suppose that condition (D.1) holds, $W_S < W_{L+S}$ and clawback adoption deters manipulation. There exist parameter configurations for which two pure-strategy stable Nash equilibria exist, one where both firms adopt and another where none adopts. The configurations satisfy

\[
\left[ Pr(x_H, x_H|m, m) - Pr(x_H, x_H|0, m) \right] \Delta y \geq W_S - W_C \quad \text{and} \\
W_S - W_C \geq \left[ Pr(x_H, x_H|m, 0) - Pr(x_H, x_H|0, 0) \right] \Delta y.
\]

Notice that the enforcement costs are now endogenous to the level of manipulation induced simultaneously by both firms. Thus, there exists a mapping between this version of the model and the reduced-form interpretation. As a final note, the prevalence of either of the two clawback equilibria are determined not only by changes in clawback regulations but also more general changes in disclosure requirements, which alter the benefits from obscuring information to outsiders.