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Clawback Provisions, Executive Pay, and Accounting Manipulation

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Abstract

Clawback provisions allow shareholders to recover previously-awarded compensation from managers involved in accounting manipulation or misconduct. I assess theoretically and empirically the effects of clawback provisions on the structure of managerial compensation and the frequency of accounting manipulation. In a principal-agent model I show how, in the presence of clawback enforcement frictions, clawback adoption can tilt the optimal compensation schedule towards the long-term. I test the empirical relevance of the theoretical implication using data from U.S. public firms in the 2002-2016 period. The identification deals with the endogenous timing of adoption and measurement error by exploiting variation in clawback adoption across a firm's board interlock. I find that, in those firms with fewer pre-adoption independent directors, clawback adoption increases the wealthperformance sensitivity of unvested (long-term) compensation, while reduces the frequency of earnings manipulation. The results suggest that enforcement frictions are relevant, particularly for firms where managers face weak monitoring by shareholders.

JEL Codes: D86, G34, J33.

Keywords: Clawback, executives, governance, compensation, accounting manipulation.

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"If clawbacks had been in place a decade ago, those scandals at Deutsche and Wells might never have erupted in the first place. Clawbacks need claws."
Financial Times, September 29, 2016

1 Introduction

In September 2016 directors at Wells Fargo triggered a clawback provision that recovered from the then CEO John G. Stumpf $69 million of compensation, which amounted to four times his annual pay. As internal investigations found out, Mr. Stumpf supported the incentive schemes that propelled the creation of thousands of bank accounts without customer consent.[1] The events at Wells Fargo illustrate that clawback provisions— or simply "clawbacks"— enable shareholders to recover compensation from managers in cases of fraudulent reporting, such as accounting manipulation, or misconduct. Once a rare governance tool, clawbacks are present in 80 percent of U.S. public firms as of 2016. This increased popularity follows a series of regulatory reforms and recommendations from proxy advisory firms that encourage or mandate the adoption of clawbacks.[2] However, clawback enforcement is infrequent compared to, for instance, the number of financial restatements.[3] Is this suggestive that the threat of a clawback deters accounting manipulation practices or, by contrast, that shareholders find severe enforcement limitations, which reduce the effectiveness of the provisions?

This paper assesses, both theoretically and empirically, the effects of clawback adoption on executive pay and accounting manipulation when clawback enforcement frictions are present. For this purpose, I develop first a principal-agent model in which shareholders can induce a risk-neutral manager to exert unobservable effort to enhance a firm's long-term profitability. Shareholders can offer compensation based on short-term earnings announcements and satisfy the manager's preferences for early compensation. However, the manager can manipulate earnings, which reduces their informativeness and increases the cost of short-term incentive compensation. Hence, deferred compensation

[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]The share of clawback adoption across U.S. public firms increased from roughly 0 percent in 2002, when the Sarbanes-Oxley Act was enacted, to 80 percent in 2016. In Appendix A I report the recent trends of clawback adoption across U.S. firms and describe the regulatory environment. For proxy advisory recommendations see Institutional Shareholders Services (2017), Skadden, Arps, Slate, Meagher & Flom LLP (2017).

[3]Fried (2016) reports 14 enforcement actions by the SEC under the Sarbanes-Oxley Act in 2002-2012. Information on cases of private clawback enforcement appears in, e.g. "Wells Fargo CEO's $41 million ranks only third among executive-pay clawbacks, forfeitures", *MarketWatch*, September 29, 2016, and "Companies discover that it's hard to reclaim pay from executives", *The Wall Street Journal*, November 20, 2006.

and clawback provisions arise as tools 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, which requires shareholders to pay high and frequent bonuses to induce effort due to the noisy short-term earnings announcements. 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.

The introduction of a clawback plays two roles. First, a clawback reduces the manager's rewards from manipulation, which lowers the cost of inducing effort through short-term compensation. Second, a clawback reduces the expected compensation costs by allowing shareholders to recover the unduly-granted pay when a manager manipulates earnings. These two effects provide an unambiguous advantage to clawback contracts but, realistically, I assume that clawback adoption entails frictions that generate enforcement costs and a limited recovery capacity for shareholders. The frictions are represented through a fixed cost of adoption— that drives the adoption decision— and a limited recovery capacity— that drives the adoption decision and shapes the optimal contract schedule with clawbacks.

I show that the optimal contract with a clawback provision is always a fully short-term compensation contract when enforcement is perfect— i.e., if shareholders can fully recover the unduly-obtained short-term bonuses. In other words, with perfect enforcement clawback contracts are akin to contingent deferred compensation contracts, in which shareholders circumvent the costs of managerial impatience. In contrast, if enforcement entails a limited recovery, the optimal contract with clawback may feature some deferred compensation. This effect takes place because a fully short-term contract with a hardly-enforceable clawback may induce manipulation and grant information rents to the manager. Alternatively, shareholders can choose the deferred compensation scheme, which — compared to the case without clawbacks— puts more weight on short-term compensation due to the reduction in the manager's rewards from manipulation.

The main prediction of the model is that clawback adoption may lead to a contract with greater long-term incentive pay relative to the optimal contract without clawbacks. That is, clawback adoption and deferred compensation may be complement tools to deter manipulation. Thus, clawback adoption may lead to less intense manipulation by firms shifting to deferred compensation structures. This result may take place only for those firms in which, without clawbacks, shareholders tolerate manipulation and incentives are entirely provided with short-term compensation. Specifically, clawbacks and deferred compensation are complements when manipulation and, in general, agency problems are more severe.

The contribution of this paper is to show how clawback adoption and deferred compensation schemes may go hand-in-hand, providing an empirical strategy to infer the relevance of the clawback enforcement frictions. While stylized, the theoretical model features a general setting where shareholders can adopt clawbacks, opt to defer compensation and also face clawback enforcement frictions. In the optimal contracts literature, clawback provisions are assimilated to contingent deferred compensation contracts— see, e.g. Marinovic and Varas (2017), Makarov and Plantin (2015), Edmans et al. (2012) and Levine and Smith (2009). In contrast, in this paper, I highlight how clawback provisions can relax the limited liability of managers, but enforcement frictions can generate non-trivial effects on the optimal structure of compensation. Thanassoulis and Tanaka (2017), Chen et al. (2014) and Levine and Smith (2009) study clawback provisions in similar environments, but abstract from analyzing the interaction between enforcement frictions and deferred pay.

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. Hence, in the absence of manipulation, deferred compensation is less effective than short-term compensation in the provision of incentives— 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.[4]

The third assumption is that clawback enforcement is subject to frictions, i.e., recovery may be costly and incomplete. The frictions may stem from the need to set up the governance, legal or accounting structures that minimize litigation with the manager and make effective the threat of a clawback. This assumption captures the idea that powerful

[4]In particular, I show this in a signal-jamming version of the 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.

managers may resist against earnings restatements or against recognizing misconduct (Pyzoha, 2015).[5] Alternatively, the enforcement frictions may also represent optimal governance structures that protect the manager from an opportunistic or incorrect *ex-post* use of clawbacks, which would interfere with the *ex-ante* provision of incentives to managers. This paper highlights the role of enforcement frictions to understand the impact of clawback adoption on compensation and accounting manipulation.

The model provides a procedure to infer the relevance of enforcement frictions by testing if clawback adoption tilts compensation towards the long-term. I provide reduced-form evidence using data on clawback adoption and executive compensation in public U.S. firms in the 2002-2016 period. I identify clawback adopters with a web crawler algorithm that extracts information from proxy statements. In order to study the impact of clawbacks on the time horizon of executive pay, I compute the wealth-performance sensitivity of executive pay (Edmans et al., 2009, Coles et al., 2013), considering separately its vested— short-term— and unvested— long-term— components.

The identification strategy exploits, first, the increased adoption of clawback provisions among U.S. firms that results from a series of regulatory reforms that since the early 2000s— e.g., the 2002 Sarbanes-Oxley Act and the 2010 Dodd-Frank Act— encourage or mandate the adoption of clawback provisions.[6] Most regulations are "soft" comply-or-explain recommendations, rather than a "hard" compulsory adoption rule. However, the increasing share of adoption of clawback provisions seems driven by a regulatory compliance motive.[7] Moreover, the adoption of clawback provisions is a standard recommendation of proxy advisory firms (Institutional Shareholders Services, 2017, Skadden, Arps, Slate, Meagher & Flom LLP, 2017), which reinforces the compliance motive.

[5]Anecdotal evidence suggests that sometimes firms face costs from recovering executive pay, such as legal bills, that exceed the amount of compensation to recover from managers. See "Companies discover that it's hard to reclaim pay from executives", *The Wall Street Journal*, November 20, 2006, and "Sorry, I'm keeping the bonus anyway", *The New York Times*, March 13, 2005. Another source of clawback enforcement costs may arise from managers switching from accruals-based manipulation to real earnings manipulation (Chan et al., 2015).

[6]The 2010 Dodd-Frank Act rules all publicly-traded firms to adopt and disclose a clawback policy that allows shareholders to recover erroneous compensation after financial restatements, with a three-year lookback period and without the need to prove misconduct. See Section 954 of the Dodd-Frank Wall Street Reform and Consumer Protection Act, "Recovery of erroneously awarded compensation", Pub. L. No. 111-203, § 954, 124 Stat. 1376(2010). The Securities and Exchange Commission (SEC) last-proposed rulings appear in: "Listing Standards for Recovery of Erroneously Awarded Compensation", Securities Act Release 33-9861, Exchange Act Release No. 34-75342, 80 Fed. Reg. 41144 (proposed July 1, 2015) (to be codified at 17 C.F.R. pts. 229, 240, 249 & 274) (also available at `http://www.sec.gov/rules/proposed/2015/33-9861.pdf`).

[7]All public firms must comply with the Dodd-Frank clawback regulations, but the SEC's final rulings are undelivered as of September 2018. 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`. The infrequent cases of clawback enforcement by the SEC hint that a hard compliance requirement is unlikely (Fried, 2016).

Second, while regulation changes— or the anticipation thereof— represents the main trigger of clawback adoption, there exists heterogeneity regarding the timing of adoption. For instance, I find that big firms with good governance, low leverage and poor stock market performance are early clawback adopters. Thus, in order to consistently estimate the effects of clawback adoption on executive compensation variables needs to control for such observable determinants. However, the early or late adoption decision may still be correlated with unobservable factors that determine the regulatory compliance preferences of firms that may also be correlated with executive compensation decisions. On top of this, the web crawler algorithm may fail to identify all clawback adopters, which may affect the bias of Ordinary Least Squares (OLS) estimates.

In order to alleviate the endogeneity and misclassification concerns, I devise an Instrumental Variable (IV) strategy that exploits exogenous variation in clawback adoption across each firm's board interlock. Specifically, I use as an instrumental variable the lagged share of clawback adoption across firms that are connected with the individual firm in second-degree through their board interlock— i.e., those firms that have a director in common with other firms that share a director in common with the individual firm. The relevance of the instrumental variable relies on the existence of governance spillovers through the network of directors that encourage the adoption decision of an individual firm (Gantchev et al., 2017, Foroughi et al., 2016, Bouwman, 2011).

The validity of the instrumental variable rests on the exclusion restriction that shocks to compliance preferences in second-degree connected firms are uncorrelated with omitted determinants of current compensation. When I construct the instrumental variable, I exclude firms with direct— or first-degree— connections. The clawback adoption decision may arise from a shock to governance preferences of the directors in common, which may well determine other executive compensation policies. Thus, I exploit indirect links that rule out major governance changes besides the adoption of a clawback. Besides, I only count second-degree connected firms that are outside of the individual firm's industry— defined at the two-digit SIC level. In this manner, I can rule out factors that may affect jointly the clawback adoption decision by firms in the same industry and the structure of compensation, namely, competition-for-talent concerns.

The results show that clawback adoption leads firms to increase the sensitivity of long-term compensation when firms, pre-adoption, display lower director independence, which I take as a proxy for the lack of enforcement and monitoring. In particular, the clawback-induced increase in the sensitivity of long-term compensation is of 34 percent for firms located at the 10th percentile of the distribution of the pre-adoption director independence. In contrast, the estimated effect is a reduction of 26 percent for firms in the 90th percentile of the distribution of the pre-adoption director independence. Moreover, I find that clawback adoption reduces the frequency of accounting manipulation, proxied by meet behavior and financial restatements (Dehaan et al., 2013). The reduction is bigger in firms with weaker monitoring structures.[8]

From the perspective of the theoretical model, the results suggest that firms with weaker monitoring expect a limited recovery and also limited effectiveness of clawbacks as a way to deter manipulation. Thus, clawback adoption and deferred compensation are both necessary to reduce the rent-extraction of managers associated with accounting manipulation. The results provide the negative perspective that firms find significant enforcement difficulties. However, at the same time, the results point that firms still respond to regulation changes by using alternative compensation schemes that also deter accounting manipulation practices and overcome the enforcement frictions.

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. Section 6 concludes.

2 Review of the literature

This paper is related to the theoretical literature on manipulation incentives in principal-agent models.[9] In Crocker and Slemrod (2007) a manager must exert *ex-ante* unobservable effort and can manipulate an *ex-post* performance metric. Relative 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.[10]

Pagano and Immordino (2012) show how investment in internal auditing and pay-for-performance are substitutes at jointly alleviating empire-building incentives and inducing unobservable managerial effort. In Peng and Röell (2014) a manager has an uncertain

[8]These results are robust to the inclusion of industry-year and executive-firm fixed effects, to alternative industry classifications, and to restricted periods of analysis. The OLS results suggest a very small impact of clawbacks on the outcome variables, confirming the attenuation bias of the unobservable factors and measurement error.

[9]Early references include Stein (1989), Stein (1988) and Narayanan (1985).

[10]Laux (2014) and Laux and Stocken (2012) also highlight the side-effects of increasing penalties to managers on misreporting and misconduct.

propensity to manipulate that the manager learns privately 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. In this paper, I analyze how shareholders can voluntarily adopt clawback provisions that reduce the compensation costs associated with earnings manipulation actions.

To the best of my knowledge, three 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 on 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. 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 manager's risk aversion and earnings volatility. The authors provide suggestive reduced-form evidence supporting the theory. Thanassoulis and Tanaka (2017) show that mandatory clawback regulations can be effective at reducing excessive risk-taking in the banking sector.

This paper is also related 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. Differently from this literature, in this paper, I consider that clawbacks relax managerial limited liability but with enforcement frictions. The analysis leads to new insights on the substitutability or complementarity between deferred compensation and clawback adoption.

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 (Pyzoha, 2015). In this paper, I contribute to this literature by exploiting exogenous variation from adoption in other industries to estimate the effects of clawback adoption. Moreover, I analyze the impact of clawback adoption on the structure— long vs. short-term— of incentive compensation.

In this paper, I identify the effects of clawback provisions relying on exogenous variation from the adoption of clawbacks by peer firms. Several studies confirm that governance policies spread out across the network of firms that are connected through the board of directors. Gantchev et al. (2017) show that firms with board connections to past targets of hedge funds improve their valuation and the probability of being targeted declines. Foroughi et al. (2016) exploit staggered adoption of universal demand laws across US states and find that a firm's propensity to adopt several governance provisions increases after firms in the same board interlock network adopt similar policies. Bouwman (2011) finds that firms that share common directors self-select into governance structures but also influence the adoption of governance policies between them.

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 and greater performance-sensitivity of stock options are associated with more intense *ex-post* manipulation. In this paper, I provide evidence on the effects of clawback provisions both on the structure of compensation and accounting manipulation.

Lastly, this paper contributes to the literature on the regulation of executive compensation after the 2007-2009 financial crisis. There is agreement among policymakers and practitioners that flawed incentive schemes fueled managerial misconduct and the subsequent crisis. The new set of worldwide financial regulations foster the lengthening of pay horizons and the adoption of clawbacks.[11] 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 accounting manipulation and the role of enforcement frictions. In particular, I highlight the complementarities between both clawbacks and deferred compensation in removing earnings manipulation incentives

[11] See Financial Stability Forum (2009) and "Guidance on sound incentive compensation policies" Federal Register, Vol. 75, No. 122, Friday, June 25, 2010, available at `https://occ.gov/news-issuances/federal-register/75fr36395.pdf`.

when enforcement frictions are relevant.

3 The model

In this section, I present the ingredients of the theoretical framework. The model features a 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 cost of incentive compensation.

Preferences and technology

Consider a three-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 $e \in [0, 1]$ 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 $e = \overline{e} > 0$ 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 the realization of y at $t = 1$. With this information, the manager generates 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 $m \in [0, 1]$. In contrast, the manager announces 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, $m = \overline{m}$.[12] The probabilistic success of manipulation and the private manipulation cost stem from the *ex-ante* monitoring mechanisms that may prevent the manager from circumventing internal controls.[13]

[12] It may be possible for the manager to announce earnings x_L after observing y_H but, as long as under-reporting provides no benefits to the manager, the optimal contract always induces truthful reporting after the manager observing y_H.

[13] 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

While manipulation may be successful at $t = 1$, 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.[14]

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).[15]

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 $t = 2$.[16]

I assume that 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*

to generalize the model to the case with non-zero levels of low effort and low manipulation.

[14]There is an equivalent interpretation of the model where the manager embarks on 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.

[15]Earnings manipulation generates an advantage for managers as long as the assumptions of the revelation principle fail. Thus, manipulation is relevant in equilibrium if, for instance, managers and shareholders may have limited commitment in their after-earnings continuation decision, as in Arya et al. (1998) or as I show in an extension in Appendix C. Moreover, communication with the manager may be restricted due to, e.g., a dispersed ownership structure.

[16]The limit on the amount to recover follows usual restrictions on the amount and type of compensation that shareholders can recover. Legally, this amount captures the part of compensation that is granted only because of manipulation. In the model, the manager would obtain an excess compensation of $w_H - w_L$ because of manipulation.

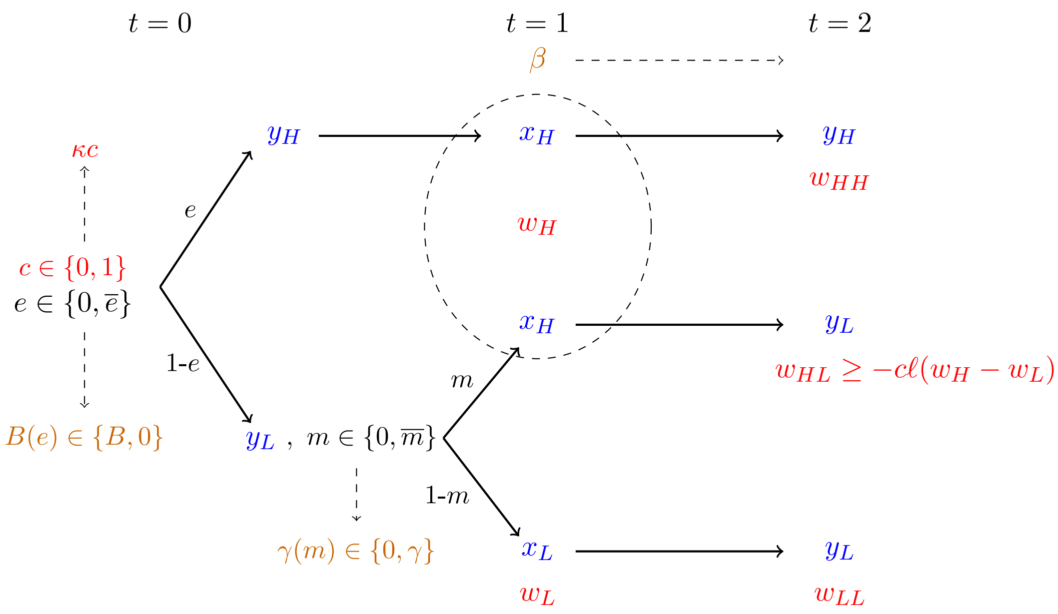

Figure 1: Timing of events and elements of the model.

resistance to restate earnings and litigation after the clawback trigger. Thus, shareholders must adopt suitable governance structures or face costly litigation for an effectively trigger of the clawback. Alternatively, the enforcement frictions may represent an optimal governance structure that protects the manager from an opportunistic use of the clawback provision.[17] 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 its elements in Figure 1.

Discussion

The clawback enforcement cost κ and the limited recovery ℓ 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 U.S. regulations on clawback provisions improves the ability of shareholders to claw back compensation. For instance, the 2002 Sarbanes-Oxley Act gave the right to the SEC to recover executive pay in cases of accounting manipulation or misconduct, while the 2010 Dodd-Frank Act

[17] Opportunistic 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 highlights the importance of activist pressure 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.

proposed that all public firms adopt a clawback provision that automatically recovers erroneously-awarded compensation after financial restatements. Thus, I interpret the new rules as a reduction in κ or an increase in ℓ for publicly-traded firms.[18]

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 consumes the unrecoverable pay and the net returns of the private investment.[19]

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 two main predictions of the model that I test in the empirical section.

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

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

[18]In Appendix A I provide further details on the institutional setting. Anecdotal evidence suggests that, mainly in the early 2000's, the recovery of incentive pay is frequently impractical and that legal bills sometimes exceed the size of the recovered pay. See "Companies discover that it's hard to reclaim pay from executives", *The Wall Street Journal*, November 20, 2006, and "Sorry, I'm keeping the bonus anyway", *The New York Times*, March 13, 2005. Besides, in Appendix A I illustrate how firms disclose their clawback provisions in proxy statements and describe the events surrounding the recent Wells Fargo scandal.

[19]In Appendix C 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 and tolerating manipulation relatively advantageous.

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 high 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 $\gamma(m) \in \{0, \gamma\}$ and receives short-term compensation w_H after announcing high earnings x_H. When shareholders detect the manipulation, i.e. after a financial restatement, the manager receives w_{HL}, which can be negative with a clawback. In case of a low earnings announcement x_L the manager obtains short-term compensation w_L and long-term compensation w_{LL}.[20]

Using the manager's expected utility we can analyze the optimal effort decision at $t = 0$ and the 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

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

That is, the manager abstains from manipulation if the expected rents from manipulation are lower than the cost γ. 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 with probability $\overline{m}$ 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

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

where $m = 0$ if condition (2) holds and $m = \overline{m}$ otherwise.[21]

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.[22]

[20]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 return $1/\beta$. The alternative interpretation where the manager discounts 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 $t = 1$.

[21]If the two values in condition (3) are equal I break the indifference assuming that the manager exerts effort. Similarly, if the manipulation condition (2) holds with equality I assume that the manager abstains from manipulating.

[22]The assumption boils down to managerial effort generating sufficient additional cash flows— given

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

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

Shareholders choose the contract $\{(w_1, w_2), c\}$ that minimizes equation (4) subject to the manager's incentive compatibility constraint (3), the manager's limited liability constraints

$$(w_H, w_L, w_{HH}, w_{LL}) \in \mathbb{R}^4_+ \ ,$$

the manipulation decision m being determined by condition (2) and the "relaxed" limited liability constraint

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

In the absence of a clawback provision, $c = 0$, the 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 $e = \overline{e}$ (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 the effort incentive-compatibility con-

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 are sufficiently high so that the firm generates sufficiently high cash flows to finance any short-term and long-term compensation to the manager.

straint, expression (3), can be written as

$$w_H \leq \frac{\gamma}{(1-\beta c\ell)\overline{m}} \tag{5}$$

$$\big[1 - m(1-\beta c\ell)\big] w_H + \beta w_{HH} = \frac{B}{\overline{e}} - \gamma(m) \tag{6}$$

From condition (6) notice that the possibility of manipulation, $m = \overline{m}$, 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 than long-term compensation at inducing effort, and thus cheaper, due to the manager's discounting of deferred compensation, $\beta < 1$.

The term $\frac{\gamma}{(1-\beta c\ell)\overline{m}}$ 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 $\frac{B}{\overline{e}}$ on the right-hand side of condition (6) summarizes the severity of the unobservable effort problem, i.e. the severity of the standard agency problem. It represents the minimum level of short-term pay that induces effort when the manager chooses $m = 0$. Thus, if $\frac{B}{\overline{e}} > \frac{\gamma}{(1-\beta c\ell)\overline{m}}$ 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. However, conditions (5) and (6) also show that a clawback provision, $c = 1$, (i) affects qualitatively equivalent to an increase in the personal cost of manipulation for the manager and (ii) improves the effort incentives of short-term compensation. In other words, the manipulation problem becomes less severe, and thus, short-term compensation is more effective at inducing effort. In particular, the effectiveness of the clawback increases with β and ℓ, since long-term and short-term rewards give similar utility to the manager and shareholders can recover more compensation. The reduction in the costs of short-term compensation may hint in principle that deferred compensation and clawback adoption are substitutes. However, this may not always be the case as shown below.

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 $\frac{B}{\overline{e}} \leq \frac{\gamma}{\overline{m}}$ the optimal contract without clawback pays only a short-term bonus $w_H = \frac{B}{\overline{e}}$ 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 $\frac{B}{\overline{e}} > \frac{\gamma}{\overline{m}}$ 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*

$$w_H = \frac{\gamma}{\overline{m}} \text{ and } w_{HH} = \frac{1}{\beta}\left(\frac{B}{\overline{e}} - \frac{\gamma}{\overline{m}}\right) . \tag{7}$$

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

2. *Short-term compensation, featuring manipulation, namely*

$$w_H = \frac{B/\overline{e} - \gamma}{1 - \overline{m}} \text{ and } w_{HH} = 0 . \tag{8}$$

   The expected cost of this contract is $W_S = \left(\overline{e} + \frac{\overline{m}}{1-\overline{m}}\right)\left(\frac{B}{\overline{e}} - \gamma\right) > B$.

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

The adoption of a 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, ℓ, and managerial discounting, β, 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. 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 $\frac{B}{\bar{e}} > \frac{\gamma}{(1-\beta\ell)\overline{m}}$ 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*

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

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

2. *Short-term compensation, featuring manipulation, namely*

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

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

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

Hence, contracts with clawback allow shareholders to reduce the direct compensation burden— net of enforcement costs κ— relative to the contracts without clawback. A clawback contract reduces the manager's temptation to choose $m = \overline{m}$ 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. Clawbacks allow shareholders to make the final payoff to the manager contingent on the long-term realization of cash flows while avoiding the deferral costs. However, a fully short-term compensation contract may still induce manipulation and pay the manager with a higher frequency, due to the limited recovery $\ell < 1$ and discounting $\beta < 1$, than the contract with deferred compensation. Thus, shareholders may opt to defer compensation with a clawback provision because it allows putting greater weight on short-term incentives while incurring in lower deferral costs than in the equivalent contract without clawback. 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 a complete recovery, $\ell = 1$, the optimal contract with clawback is always an exclusively short-term compensation contract.*

The optimal clawback contract with complete 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 $\overline{e}$. That is, the optimal clawback contract is equivalent to a contingent-deferred compensation contract in which shareholders save from the costs of deferrals. The existence of limited recovery makes short-term contracts with clawback less attractive because the manager can obtain rents from manipulation that exceed the costs for shareholders of partly deferring manipulation.

4.2 Optimal contracts and empirical predictions

Here 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 provide predictions for the effects of clawback adoption on manipulation and the 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 too 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_{S+L}, 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 ($W_S < W_{S+L}$) when B is high, β is low, and γ is low.*

Figure 2 illustrates the configuration of the optimal contracts without clawbacks in the space delimited by the managerial private benefits B and discount factor β. Three regions appear in the space of parameters: (i) the region $(S, 0)$ where full short-term contracts without manipulation are feasible, $B/\bar{e} \leq \gamma/\overline{m}$, and optimal, (ii) the region $(S + L, 0)$ where partly-deferred compensation contracts are optimal and (iii) the region $(S, \overline{m})$ where full short-term contracts with manipulation are optimal. Consistent with the predictions of Proposition 6, inducing manipulation is optimal for high private benefits and low discount factors. Moreover, a reduction in the parameter γ expands the region $(S, \overline{m})$, against a contraction in the other two regions.

Are the predictions of Proposition 6 consistent with the empirical literature? In the model, manipulation is the optimal outcome when the managerial discount factor, β, is sufficiently low, i.e., when deferring compensation becomes significantly expensive. Biggerstaff et al. (2015) and Hazarika et al. (2012) find that more intense forced CEO turnover, a possible proxy for greater managerial impatience, is associated with more intense earnings management and misbehaviour.

Besides, manipulation is optimal when the private benefits B are high since the cost of deferrals exceeds the manipulation rents of the manager. B captures the quality of corporate governance that limits the rent-extraction of managers. Another suitable proxy for B is firm size. For instance, Gayle et al. (2015) show that firm size differentials in

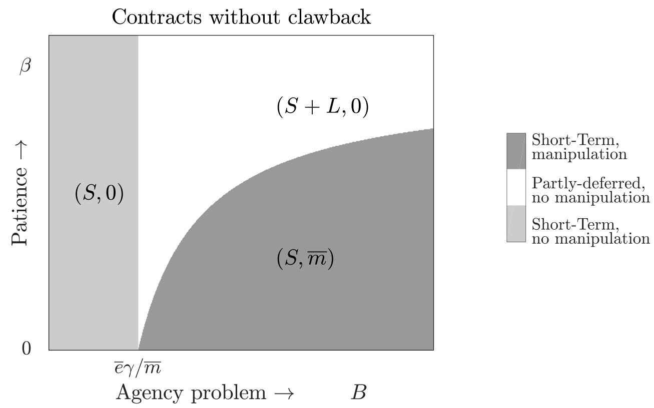

Figure 2: Configuration of optimal contracts in the (B, β) space. $(S, 0)$ denotes the region where short-term contracts are optimal without manipulation, $(S, \overline{m})$ denotes the region where short-term contracts are optimal and induce manipulation, $(S + L, 0)$ denotes the region where contracts with partly-deferred compensation are optimal.

the level of executive compensation can be explained by shareholders receiving noisier information about managerial performance in bigger firms.[23] 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. Besides, Nelson et al. (2002) show that Big 4 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 γ decrease, which increases the required level of costly deferrals in the partly-deferred compensation contract. Suitable proxies for γ are measures of the strength of *ex-ante* monitoring or proxies for earnings manipulation. However, manipulation is an endogenous outcome determined by the, also endogenous, structure of managerial incentives. Hence, the empirical predictions regarding γ are harder to test.[24]

Effects of clawback adoption

If clawback adoption is feasible but subject to frictions, 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

[23] Alternative interpretations for the relationship between moral hazard, firm size, and executive compensation appear in Dicks (2012), Edmans et al. (2009) and Gayle and Miller (2009).

[24] Proposition 6 is silent about the effect of the intensity of manipulation, $\overline{m}$, and the probability of high cash flows, $\overline{e}$, on the optimality of manipulation contracts. Manipulation is the optimal outcome for intermediate values of both parameters, i.e., when manipulation represents a mild and infrequent possibility. This is consistent with real-world cases where manipulation scandals often arise as a surprise, as argued by Peng and Röell (2014). That is, the *ex-ante* adjustment in security prices is small given that manipulation seems unlikely, so the *ex-post* reaction in prices after the detection must be large (Benmelech et al., 2010, Kedia and Philippon, 2009).

manipulation changes after an exogenous reduction in the enforcement costs, κ, that leads to clawback adoption— e.g., driven by changes in regulation, or firm-specific governance structures. Importantly, κ affects only the clawback adoption decision, while ℓ affects both the structure of compensation in the presence of a clawback and the clawback adoption decision.

Figure 3 illustrates the effects of clawback adoption on the optimal contract configurations when enforcement costs drop to zero, but recovery is still limited, $\ell < 1$. In such situation, adoption is always optimal in the region where $B/\overline{e} > \gamma/\overline{m}$, since clawbacks always reduce compensation costs, while it adds no value for $B/\overline{e} \leq \gamma/\overline{m}$.[25]

Two main features of Figure 3 are noticeable regarding the impact of clawback adoption on the extent of manipulation. The first is that, as it follows from Proposition 3, clawbacks expand the region of parameters where managers abstain from manipulation while receiving all incentives in the short-term — region $(S, 0)$ expands on the right panel of Figure 3 relative to the left panel. The second feature is that clawback adoption removes manipulation in part of the region of parameters where, without clawback, manipulation is optimal— region $(S, \overline{m})$ on the left panel. Specifically, manipulation disappears because a clawback (i) is effective at deterring manipulation in a fully short-term contract— switch to region $(S, 0)$— or (ii) increases the attractiveness of deferred compensation contracts— switch to region $(S + L, 0)$. Importantly, as Proposition 5 highlights, the latter case is possible only because of a limited clawback recovery, $\ell < 1$.

The increased reliance on short-term compensation structures may have side effects on the intensity of manipulation. A shift from partly-deferred to fully short-term compensation with clawback may lead to more intense manipulation. Figure 3 shows that a switch from the region $(S + L, 0)$ on the left panel to the region $(S, \overline{m})$ on the right panel is possible. Specifically, the dark-grey region above the dashed line on the right panel of Figure 3 depicts a space of parameters where clawback adoption leads to manipulation. This is possible because clawback adoption avoids the costs of deferrals, and shareholders may still tolerate manipulation as the second-best option. This result 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).

The key takeaway is that we can infer the relevance of the enforcement frictions captured by ℓ by observing the effect of clawbacks on the structure of pay. In particular, Figure 3 highlights that firms that display weaker *ex-ante* monitoring, higher B, are those

[25]Therefore, the discussion about the effects of clawback adoption is meaningful for the space of parameters where $B/\overline{e} > \gamma/\overline{m}$ and clawbacks have some effect.

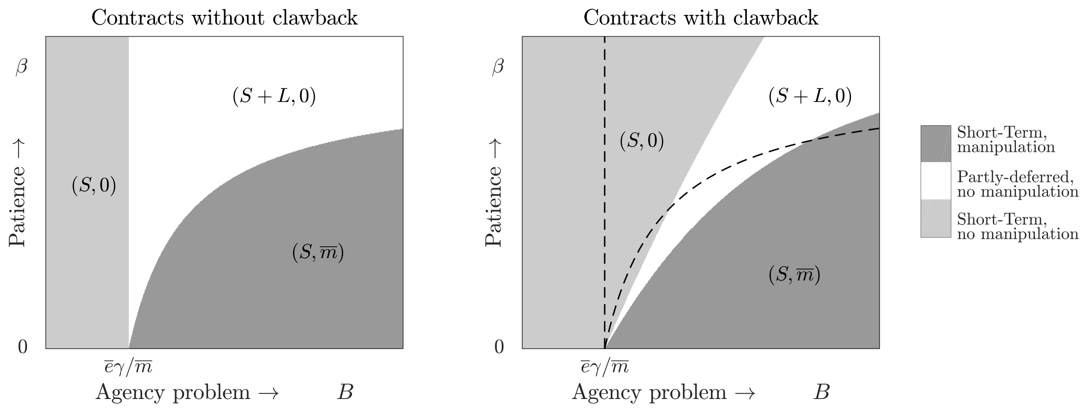

Figure 3: Configuration of optimal contracts in the (B, β) space. The left panel depicts the case where clawback provisions are unenforceable. $(S, 0)$ denotes the region where short-term contracts are optimal without manipulation, $(S, \overline{m})$ denotes the region where short-term contracts are 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.

that may increase the size of long-term incentive compensation. Thus, if we observe firms with weaker monitoring shifting to long-term compensation structures after the adoption, then it is because enforcement frictions are relevant. I summarize this in the following prediction, which I test in the empirical section.

Prediction. *Under enforcement frictions, clawback adoption tilts compensation structures towards the long-term in firms with weaker ex-ante monitoring. In contrast, firms with stronger ex-ante monitoring shift to short-term compensation structures.*

5 Empirical evidence

In this section, I provide empirical evidence about the predictions of the model. First, I show descriptive evidence on the determinants of clawback adoption. Second, I posit an instrumental variables strategy that exploits the adoption of clawback provisions in the board interlock of the individual firm. The empirical evidence, interpreted through the lenses of the theoretical model, lends itself to provide a policy evaluation of the effects of clawback adoption.

5.1 Data

I compile a dataset that includes information on executive compensation, earnings announcements and clawback adoption in U.S. public firms for the 2002-2016 period. 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. I exclude all financial firms and utility firms (SIC codes between 6,000 and 6,999 and between 4,900 and 4,999, respectively).[26]

As a measure of managerial incentives, I consider the wealth-performance sensitivity of executive compensation, following Edmans et al. (2009). This variable, denoted by Δ_{Total}, measures the increase in an executive's wealth (in million dollars) out of a one percent increase in shareholder value. To analyze the time structure of incentive pay, I split Δ_{Total} into two components. First, I denote by Δ_S the wealth increase from the portfolio of vested stock and stock options, whose liquidation value is more sensitive to short-term manipulation decisions. The remaining part of Δ_{Total} represents the long-term component of incentives, denoted by Δ_L.[27]

In order to study the effects of clawbacks on the frequency of earnings manipulation, I consider two proxies, following Dehaan et al. (2013). First, the empirical evidence suggests that firms tend to embark on earnings management around analysts' forecasts, or "meet-or-beat" behavior (Dechow et al., 2010).[28] Managers with stock-based compensation have incentives to embark in earnings management because firms that "meet-or-beat" analyst forecasts obtain higher valuations or abnormal returns (Bird et al., 2016, Kasznik and McNichols, 2002).[29] Therefore, I define the indicator variable $Meet$ that takes a value

[26]Most of the results are highly invariant to the inclusion of both sectors, even considering that TARP-recipients— mostly financial firms— were mandated to adopt clawback provisions. I provide further details on the construction of the dataset in Appendix D.

[27]Appendix D provides the details on the computation of the wealth-performance sensitivities. Some part of the long-term wealth-performance sensitivity, Δ_L, may vest in a few months, akin to a short-term component. Thus, the measured Δ_L represents an upper bound on the value of illiquid securities held by an executive.

[28]Dechow et al. (2010) argue that "meet-or-beat" behavior is informative about earnings management practices. Firms use several mechanisms to meet earnings forecasts, such as managing tax expenses or accruals (Dhaliwal et al., 2004), managing the classification of items (McVay, 2006), managing accruals (Moehrle, 2002), or repurchasing stock, and selling fixed assets or marketable securities (Bens et al., 2003, Herrmann et al., 2003, Hribar et al., 2006). Moreover, this type of behavior is related to lower audit quality (Frankel et al., 2002).

[29]Keung et al. (2010) and Koh et al. (2008) find that "meet-or-beat" generates abnormal returns that decreased after the early 2000s accounting scandals. Firms seem to obtain lower rewards despite "meet-or-beat" being associated with higher future cash flows. Thus, investors and analysts must associate certain

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 (Dehaan et al., 2013). Second, I also consider financial restatements, denoted by the indicator variable $Restate$.[30]

I report in Appendix D univariate tests across the samples of $Meet$ and $Restate$ as well as the definitions of other variables. The tests show that $Meet$ and $Restate$ is associated with less intense monitoring— proxied by the number of independent directors and CEO tenure— and steeper short-term incentives— proxied by the ratio Δ_S/Δ_{Total}. Furthermore, in Appendix E I provide empirical evidence that suggests that compensation structures tilted towards the short-term are linked to accounting manipulation practices. Specifically, I show that short-term incentives are relatively steeper when executives display a high frequency of past manipulation, proxied by $Meet$ and $Restate$. The results hold controlling for several firm characteristics, firm fixed effects and firm-executive fixed effects. Thus, the results are in line with shareholders having to provide steeper incentives to induce better decision-making by those managers that report accounting information of lower quality. Moreover, results from logit estimations suggest that steeper *ex-ante* short-term incentives are associated with *ex-post* higher probability of meeting or beating the analysts' forecasts.[31] Thus, managers behave opportunistically to boost their compensation by meeting the earnings forecasts.

5.2 The determinants and effects of clawback adoption

Table 1 reports estimation results that uncover the main determinants of clawback adoption. Specifically, I estimate logit models for the probability of a firm having a clawback provision, conditional on a set of pre-determined firm characteristics.[32] The first column reports that firm size, director independence, and stock return volatility have a positive and statistically significant relationship with the likelihood of firms having a clawback. Firms with lower stock returns are also more likely to have a clawback. The analysis by different time windows, second to fourth columns, confirms that smaller firms tend to adopt later, while the relationship between adoption and director independence remains

firms with manipulation activities. However, firms that systematically "meet-or-beat" the earnings forecasts obtain longer strings of higher returns (Myers et al., 2007, Kasznik and McNichols, 2002, Barth et al., 1999). In a regression-discontinuity setting Bird et al. (2016) find that investors reward firms that just-meet the consensus forecast with 1.5 percentage points higher cumulative market-adjusted returns.

[30]The frequency of financial restatements is a less powerful measure of earnings manipulation. The amendment of financial statements depends largely on the willingness of executives to accept a restatement (Dehaan et al., 2013).

[31]The results are in line with those of Burns and Kedia (2006) that find that the slope of the vested stock options is steeper for firms that *ex-post* embark on fraud.

[32]I include three-year averages of the explanatory variables, except for the binary variables that are one-year lagged values.

constant.

Furthermore, in the initial period of analysis, firms with lower leverage and stock returns were more likely to have a clawback. Moreover, higher stock return volatility and dividend yields were associated with the adoption in that period. Lastly, firms are less likely to adopt early a clawback when a Big 4 audit firm is present.

These descriptive results hint that early adopters are bigger than non-adopters, either because these firms face more severe agency problems (Gayle et al., 2015), they face smaller enforcement costs or are subject to stronger monitoring from regulators or proxy advisory firms. Moreover, the positive and time-invariant relationship with the number of independent directors suggest that good governance and lower enforcement frictions are an important determinant of clawback adoption. The fact that early adopters feature lower and more volatile stock returns, lower leverage and lack a Big 4 audit firm suggests that firms use clawbacks as a governance tool in periods of distress and in the absence of alternative monitoring mechanisms.

In the remainder of this section, I estimate the effects of clawback adoption on outcome variables of interest, namely the time structure of executive compensation and the frequency of manipulation.[33] In particular, the interest lies on testing the implication that firms with weak monitoring can increase the level of long-term incentives after the adoption of a clawback. For this purpose, I consider director independence as the main proxy for the strength of internal monitoring (Arena and Ferris, 2007, Gillette et al., 2003, Weisbach, 1988, Fama and Jensen, 1983). I postulate the following empirical specification for an outcome variable y for executive i, firm j, and year t:

$$y_{ijt} = \alpha_1 Clawback_{ijt} + \alpha_2 Clawback_{ijt} \times \; Director\ indep._{j2002} + \Lambda' X_{ijt} + \eta_j + \varepsilon_{ijt} \quad (9)$$

$Clawback_{ijt}$ is an indicator variable that identifies a firm with a clawback and $Director$ $indep._{jg2002}$ is the number of independent directors in the board of firm j in year 2002. I choose the year 2002 as the reference pre-adoption period since clawback adoption was negligible and clawback regulations were non-existent at that point. The term η_j represents firm fixed effects that control for constant determinants of the outcome variables and X_{ijt} is a set of controls— explained below in detail— that include time fixed effects.[34]

The main empirical prediction of the model states that, when y is the measure of long-term compensation, Δ_L, the net effect of clawbacks, $\alpha_1 + \alpha_2 Director\ indep._{jg2002}$, is positive for firms with low director independence and negative for firms with higher

[33] I report in Appendix D univariate tests across the samples of clawback adopters and non-adopters.

[34] The results are robust to the inclusion of alternative sets of fixed effects, such as industry-time and firm-executive fixed effects.

Table 1: Determinants of clawback adoption: Logit estimations

	(1)	(2)	(3)	(4)
	Full sample	2003-07	2007-11	2011-15
Ln(Firm value)	0.263**	0.751***	0.358***	0.116
	(0.107)	(0.267)	(0.128)	(0.134)
Independent directors	0.217***	0.284**	0.246***	0.228***
	(0.066)	(0.119)	(0.077)	(0.080)
Big 4 (0,1)	-0.433	-2.876**	-0.920	-0.087
	(0.442)	(1.133)	(0.584)	(0.434)
Meet (0,1)	0.049	-0.599	0.061	0.160
	(0.109)	(0.470)	(0.161)	(0.144)
Restatement (0,1)	-0.153	-0.493	0.141	-0.245
	(0.172)	(0.557)	(0.245)	(0.203)
Loss (0,1)	-0.354	1.192	-0.059	-0.441
	(0.301)	(1.051)	(0.363)	(0.337)
Reported earnings	-0.045	-0.002	0.020	-0.078
	(0.064)	(0.372)	(0.083)	(0.067)
Ln(1+Forecast disp.)	-0.122	5.081	-0.628	0.489
	(1.196)	(5.178)	(1.502)	(1.261)
Analysts	0.009	-0.054	-0.012	0.025
	(0.017)	(0.054)	(0.025)	(0.020)
Leverage	0.076	-0.431***	0.017	0.231
	(0.105)	(0.160)	(0.089)	(0.197)
Stock returns	-0.095**	-0.382**	-0.107	-0.052
	(0.043)	(0.174)	(0.065)	(0.058)
Stock return volatility	0.016*	0.048*	0.023*	0.008
	(0.009)	(0.025)	(0.012)	(0.010)
Dividend yield	0.039	0.159**	0.074**	0.022
	(0.026)	(0.069)	(0.032)	(0.027)
Observations	4,823	1,034	1,625	2,104
Pseudo R^2	0.444	0.413	0.236	0.162
Adopters	2,320	59	562	1,505
Pr. of clawback	0.351	0.006	0.297	0.763
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

This table reports the results from logit estimations for the probability of a firm having a clawback provision in the 2002-2016 period. All explanatory variables are lagged three-year averages, with the exception of binary variables with are lagged one period. Adopters reports the number of firm-year observations in which a clawback exists. Pr. of adoption reports the predicted probability of adoption evaluated at the average value of the explanatory variables. The remaining variable definitions appear in Appendix D. Standard errors clustered at firm level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

director independence. That is, α_1 must be positive, while α_2 is negative. Importantly, the model predicts these signs only if clawback enforcement entails frictions that limit the recovery, which provides an advantage to deferred compensation schemes. Such frictions are more prevalent in firms with weak monitoring, which in the absence of clawbacks must provide rents to the manager in the form of steep short-term compensation.

The observed process of generalized clawback adoption responds to a great extent to regulatory changes— or the anticipation thereof— that encourage or mandate the adoption of clawbacks. Still, the results in Table 1 highlight the heterogeneous pattern in the timing of clawback adoption. The main identification concern is that the timing of adoption— i.e., the regulatory compliance preferences— may be correlated with a firm's executive compensation policies. For instance, firms may experience shifts in shareholder or director preferences that trigger the adoption of a clawback as well as a change in the structure of executive pay. Such changes in governance may allow firms to increase the sensitivity of short-term pay through improved monitoring and reduce the size of deferrals. All in all, Ordinary Least Squares (OLS) estimates of the relationship between clawback adoption and executive compensation variables should be attenuated and biased towards zero.

Besides, the web crawler algorithm that I use to identify clawback adoption may suffer from misclassification. For instance, firms' clawback adoption decision may follow purely from a regulatory compliance motive— i.e., without intention to enforce the provision— so compensation policies may remain unaffected by the clawback disclosure. Hence, some firms identified by the algorithm as clawback adopters may be effectively non-adopters. The measurement error that follows the misclassification of clawback adoption adds up to a potential attenuation bias of the OLS estimates.

I posit an instrumental variables (IV) strategy to ameliorate the endogeneity and misclassification concerns. Specifically, I exploit variation in clawback adoption within each firm's board interlock as a source of exogenous variation. I construct the instrumental variable by computing the lagged value-weighted share of clawback adoption across firms that are second-degree connected with the individual firm through board interlocks.[35] That is, for each firm i I consider the subset of firms S_k that have at least a director in the board of firm k, where a firm i's director is also present. Then, I compute the share of clawback adoption across all subsets of firms S_k. I remove from the each subset of firms S_k those firms that share at least a director in common with firm i and those firms

[35] I compute value weights using firm total value as Edmans et al. (2009) suggest. The reason for weighting by firm value is that— as reported in Table 1— bigger firms are early-adopters, and their adoption decision may be more informative about the value of clawbacks for other firms. Lastly, I use the lagged value of the instrument as the instrumental variable in the estimations to alleviate the simultaneity of executive compensation decisions across firms.

that are present in the same industry, defined at the two-digit SIC level.

The relevance of the instrument relies on the existence of governance spillovers that encourage the clawback adoption decision of an individual firm. This means that the adoption of a clawback by peers affects the regulatory compliance or governance preferences of the directors at the individual firm i. In this case, shocks to the directors' preferences that trigger clawback adoption in a firm of subset S_k should simultaneously shift the preferences of directors in firm k. This shift in preferences should then trigger a change in firm i's directors perception about the utility of clawback adoption and the compliance with regulations.

The validity of the instrument rests crucially on the exclusion restriction that unobservable time-varying factors that determine clawback adoption in second-degree connected firms are uncorrelated with omitted determinants of compensation or the accounting manipulation proxies. That is, shocks to regulatory compliance or governance preferences in peer firms are insufficient to trigger broader governance changes that also affect executive compensation policies. Besides, in order to rule out competition-for-talent concerns, I only consider those firms— both in a first-degree and in a second-degree sense— that are outside of the same industry, defined at the two-digit SIC level.[36]

The control variables X_{ijt} in equation (9) include contemporaneous values of firm characteristics: firm size, director independence, Big 4 audit firm, leverage, stock returns, stock return volatility, and dividend yield. These variables are relevant predictors of clawback adoption as reported in Table 1. To alleviate endogeneity concerns associated with these controls, I instrument them by their value measured as of 2002 interacted with year dummies to capture common exogenous trends across firms.

Table 2 reports the estimation results. Overall, the instrument performs well in the first stage, with the weak-instrument F statistics of Sanderson and Windmeijer (2016) and Kleibergen and Paap (2006) being reasonable relative to the Stock and Yogo (2005) critical values.[37] The first four columns in the table report the effects of clawback adoption on different measures of the executives' incentive slope. In the first column, the estimates

[36]The results are robust to alternative industry classifications, such as the Hoberg and Phillips (2010, 2016) text-based industry classifications. While the estimation sample excludes firms in the financial and utilities sectors, I do not exclude those firms from the group of peers of each firm.

[37]In Appendix E I report the estimates of the direct effect of clawback adoption, including the first stage results. The results indicate that the instrumental variable predicts fairly well the individual firm's probability of having a clawback. The Sanderson and Windmeijer (2016) first-stage F statistics are tests of weak identification of individual endogenous regressors. In this case, there are two endogenous regressors of interest, namely, the clawback coefficient and its interaction with the pre-adoption number of independent directors. The Kleibergen and Paap (2006) Wald rank F statistic summarizes the weak identification of all the excluded instruments. Stock and Yogo (2005) use Monte Carlo simulations to provide critical values for the weak identification F statistic for several different estimators, performance criteria— in this case, I choose a 15% size criteria—, and model configurations.

show that clawback adoption increases the level of long-term incentives, given by Δ_L, but the total effect of a clawback turns negative for firms with more independent directors before the adoption. The results are consistent with the model predictions that firms with weak monitoring may tilt their compensation structures towards the long-term, but only if clawback enforcement is also weak. Quantitatively, the estimates suggest that clawback adoption implies a large change the level of long-term incentives. For instance, firms at the 10th percentile of director independence increase the slope of long-term incentives by 34 percent. In contrast, firms at the 90th percentile of director independence decrease the slope of long-term incentives by 26 percent.[38]

The estimates in the second column show that clawback adoption reduces the slope of short-term compensation, Δ_S. The effect is increasing in the level of director independence, but the estimate is statistically insignificant. This result is also consistent with the model predictions that clawbacks allow to reduce the slope of short-term incentives by decreasing the manager's rewards from manipulation. The third column shows that the total incentives of executives, Δ_{Total}, increase after the adoption of a clawback, although the estimates are statistically insignificant. The fourth column of Table 2 shows that the estimation results where the dependent variable is the relative importance of short-term over total executive incentives. Firms with weaker monitoring seem to react to clawback adoption by substituting short-term for long-term incentives. Such substitution effect becomes negligible for firms that feature stronger monitoring.[39]

The fifth column in Table 2 reports that clawback adoption leads to an increase in the level of total current compensation— measured by the variable "tdc1" in Execucomp— for firms with weaker monitoring structures. The increase in current compensation may suggest that managers seek for higher compensation to offset the threat of a clawback. However, the variable "tdc1" includes the value of stock and stock option awards whose value is only realized in the future. Hence, the substitution of short for long-term incentives may capture the increase in the value of unvested, long-term, awards. In contrast, the effect on current compensation is negative for firms with stronger monitoring, suggesting that the shift towards short-term compensation reduces the managers' requirements for the level of current of compensation. The effects may reflect the impatience of man-

[38]From the results in Table 2, the estimated effect at the 10th percentile of director independence in 2002 (3) is 0.61-0.08×3≈0.30, so the net effect is $exp(0.30) - 1 = 0.34$. Similarly, the estimated effect at the 90th percentile of director independence in 2002 (10) is 0.61-0.08×10≈30, so the net effect is $exp(-0.30) - 1 = -0.26$.

[39]For the sake of completeness, I report in Appendix E the results from OLS estimations. The estimates provide a similar view than 2SLS regarding the relationship between long-term incentives, clawback adoption, and director independence, although the estimates are smaller in magnitude. Most of the remaining estimates are close to zero and hardly statistically significant. The results highlight the fact that OLS estimates of the effects of clawbacks suffer from an attenuation bias.

agers relative to shareholders, who face a cost from deferring compensation.[40]

The last two columns report the estimated effects of clawback adoption on the proxies for accounting manipulation, *Meet* and *Restate*. The estimates suggest that clawback adoption is effective at reducing the frequency of accounting manipulation. The results uncover that clawback adoption reduces the frequency of restatements, while the estimates are statistically insignificant for "meet-or-beat". The effects are decreasing in the number of independent directors, which highlights that clawbacks are effective at deterring manipulation where they are more necessary— i.e., in firms with weaker monitoring.

[40]Alternatively, the unvested awards may be over-valued in the computation of "tdc1".

Table 2: Effects of clawback adoption on executive compensation and earnings manipulation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Ln(Δ_L)	Ln(Δ_S)	Ln(Δ_{Total})	Δ_S/Δ_{Total}	Ln(Total comp.)	Meet (0,1)	Restatement (0,1)
Clawback	0.616***	-0.441***	0.109	-0.221***	0.379***	-0.178	-0.266***
	(0.131)	(0.167)	(0.155)	(0.038)	(0.090)	(0.114)	(0.081)
Clawback × Independent dir. 2002	-0.086***	0.011	-0.023	0.020***	-0.051***	0.023*	0.024***
	(0.017)	(0.022)	(0.015)	(0.004)	(0.010)	(0.012)	(0.008)
Observations	33,670	32,743	34,078	34,078	37,110	4,624	6,943
SWF 1st stage	13.712	11.033	11.282	11.282	15.097	5.359	16.557
SWF 1st stage (2)	13.304	12.349	11.163	11.163	10.935	10.389	11.625
Stock-Yogo 15% size critical value	8.960	8.960	8.960	8.960	8.960	8.960	8.960
Kleibergen-Paap F	5.981	5.732	5.615	5.615	5.129	4.173	5.368
Stock-Yogo 15% size critical value	4.58	4.58	4.58	4.58	4.58	4.58	4.58
Control IV	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table reports the results from two-stage least squares regressions of executive incentive measures and earnings manipulation proxies on clawback adoption for the 2002-2016 period. I instrument clawback adoption by the share of adoption across firms second-degree connected with each individual firm through the board interlock. I exclude firms that are in the same industry, defined at the two-digit SIC level. Control variables are log firm size, independent directors, Big 4 adit firm, leverage, stock returns, stick return volatility, and dividend yield. I instrument the control variables by their values measured as of 2002 interacted with year dummies. SWF 1st stage and SWF 1st stage (2) denote, the Sanderson and Windmeijer (2016) weak-identification F statistics for each first-stage equation, namely, clawback adoption and its interaction with Independent directors in 2002 on the instrumental variable and its interaction with Independent directors in 2002. KPF refers to the Kleibergen and Paap (2006) weak-identification F statistic. I report for each F statistic the corresponding critical values of Stock and Yogo (2005) for the corresponding Wald test that yields a 15% size. The F statistics correspond to first-stage regressions where exogenous variables are partialled-out. Variable definitions appear in Appendix D. Standard errors clustered at the firm level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In Appendix E I report robustness tests for the results in Table 2. The result that firms with weaker monitoring structures respond to clawback adoption by increasing the level of long-term incentives holds under different specifications. First, the results may be affected by time-varying industry shocks or executive-specific factors that might be correlated with the clawback adoption decision. In this respect, Table E.7 shows that the baseline results are robust to the inclusion of industry-time and firm-executive fixed effects. Second, the exclusion restriction can fail if the adoption decision of the individual firm is a trigger of adoption by peer— second-degree connected— firms. I alleviate this concern by estimating the effects of clawback adoption at most two years after the adoption. Table E.8 shows that the baseline results hold under such restriction. Third, Table E.9 shows that the results are also robust to considering alternative and time-varying definitions of industries, following the text-based industry classifications of Hoberg and Phillips (2010, 2016).[41]

5.3 Discussion and policy implications

The results suggest that firms with weaker monitoring shift towards long-term compensation structures after adopting a clawback. Thus, despite the possibility of clawing back past compensation, some firms switch to compensation schemes where long-term incentives are more important than in the pre-adoption period. From the perspective of the model, we can infer that shareholders in firms with weaker monitoring structures also face relevant clawback enforcement frictions. In other words, firms that face severe moral hazard problems also face important frictions from recovering previously-awarded short-term pay.[42]

Moreover, the empirical results suggest that clawback adoption reduces the frequency of accounting manipulation, with the reduction being greater in firms with weaker monitoring structures. This is consistent with other results in the literature (Chan et al., 2013,

[41] While I can confirm the main empirical implication of the model in the different tests, other auxiliary results in Table 2 are not robust to the alternative specifications. For instance, Table E.7 shows that the positive effect of clawbacks on current compensation disappears when industry-time and executive fixed effects are included. This may point that firms, after the adoption of the clawback, hire executives that require higher compensation. Besides, Table E.8 also shows that the negative effect of clawback adoption on the slope of short-term incentives disappears when one restricts the attention to the initial years after the adoption of the clawback.

[42] 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. See "Wells Fargo CEO's $41 million ranks only third among executive-pay clawbacks, forfeitures", *MarketWatch*, September 29, 2016.

Dehaan et al., 2013), and with the finding that deferred incentives are more important after the adoption. Thus, firms seem to avoid accounting manipulation by adopting clawback provisions and simultaneously lengthening the executives' pay horizon. All in all, the results hint that enforcement frictions are important and that limit the effectiveness of clawback provisions to deter the manipulation incentives of short-term compensation schemes. However, simultaneously, the results suggest that changes in regulations that ease clawback enforcement allow firms to use alternative compensation schemes that also deter accounting manipulation practices.

To conclude, the new set of worldwide financial regulations foster the lengthening of pay horizons and the adoption of clawbacks.[43] The results provide evidence that firms that respond to clawback adoption by simultaneously increasing the horizon of executive pay. Thus, policymakers can achieve both objectives of clawback adoption and longer pay horizon by alleviating the frictions associated with clawback enforcement.

6 Conclusions

In this paper, I study both theoretically and empirically the role of adopting clawback provisions when enforcement frictions are present. I develop 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 offers 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 and have a limited recovery.

The model predicts that contracts that induce accounting manipulation must feature steeper short-term compensation. Besides, clawback adoption reduces earnings manipulation through two channels. First, when the threat of recovery deters manipulation in contracts that feature exclusively short-term compensation. Second, when shareholders find valuable to shift to partly-deferred compensation structures, due to their limited enforcement capacity. Thus, clawback adoption and deferred compensation schemes may become complementary tools to deter manipulation.

I posit an instrumental variables strategy to identify the effects of clawbacks, by exploiting clawback adoption across firms in the same board interlock of the individual

[43] See Financial Stability Forum (2009) and "Guidance on sound incentive compensation policies" Federal Register, Vol. 75, No. 122, Friday, June 25, 2010, available at `https://occ.gov/news-issuances/federal-register/75fr36395.pdf`.

firm but without direct connection. The estimation results suggest that firms with pre-adoption weaker monitoring reduce the frequency of financial restatements, but also tilt their compensation towards the long-term. Thus, clawbacks allow firms to reduce the rent-extraction and the intensity of manipulation. Nonetheless, from the perspective of the theoretical model, firms with weaker monitoring expect a limited recovery and also limited effectiveness of clawbacks as a way to deter manipulation. Thus, clawback adoption and deferred compensation are both necessary to reduce the rent-extraction of managers associated with accounting manipulation.

Additional theoretical extensions deserve further discussion. For instance, manipulation may generate real costs to shareholders regarding 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 optimal contract is determined by the potential side-effects of manipulation faced by shareholders, since the expected compensation costs are pinned down by the outside option of the manager. With a binding participation constraint, the criterion for the choice of optimal contracts differ. However, I conjecture that the impact of manipulation and clawback adoption on the time structure of compensation, the focus of this paper, remains very similar.

While the reduced-form results provide a qualitative assessment of the theoretical mechanisms, it is of quantitative relevance to 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 more profound insights for future research.

To conclude, policymakers agree on the need to regulate executive pay, but academics have not found the specific market failures that executive pay regulation may solve vis-á-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 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.

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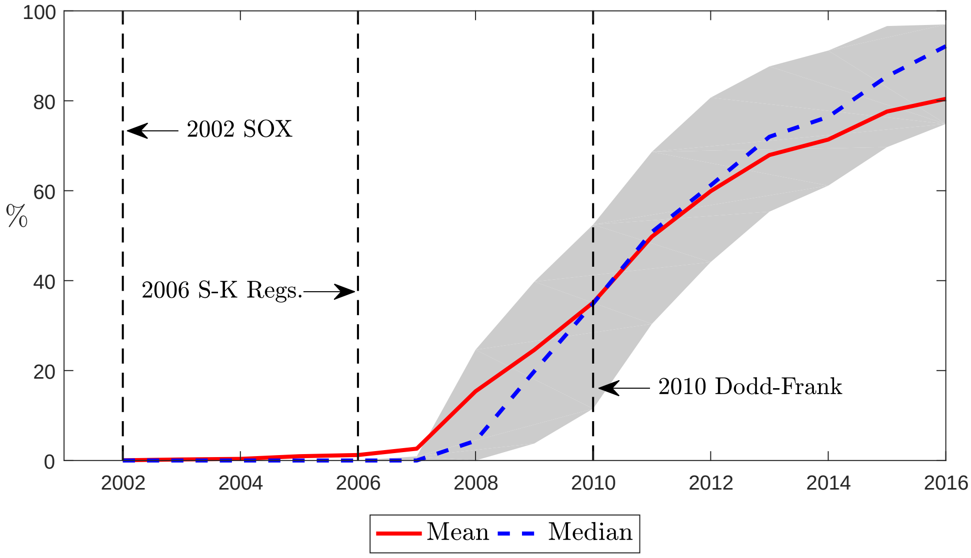

Figure A.1: Clawback adoption share across industries and time. Clawback adoption within an industry is measured as the value-weighted share of adopting firms. Industries are defined at the two-digit SIC level. The bold line represents the (unweighted) average share of adoption across industries and 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 D.

A Institutional background: The rise of clawbacks

In this Appendix, I describe the institutional background underlying the generalized adoption of clawback provisions across U.S. publicly-traded firms. In general, clawback provisions are contractual clauses that specify the conditions under which the firm can recover previously paid-out compensation. In general, shareholders can legally prosecute and seek the recovery of compensation from managers that embark in misconduct. But, importantly, clawback provisions allow the recovery of managerial pay at a lower risk of litigation due to its contractual nature. Publicly-traded firms can adopt their private clawback provisions independent of any regulatory requirements. Nevertheless, these provisions are much more common since the enactment of Dodd-Frank.

Figure A.1 illustrates the clawback adoption wave in the U.S. since the year 2002, when the Sarbanes-Oxley Act is enacted. 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%.

Sarbanes-Oxley clawback (2002)

The U.S. 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.[44] 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 in the 2002-2012 period. This is despite the thousands of accounting restatements taking place in that period.[45] Thus, the SOX clawback seems a very unreliable policy to deter manipulation. 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[46]

> "(...) 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. After 2006, companies gradually disclose in their proxies their ability to recover bonuses to comply with the new rules, which are incremental to SOX 304.

[44] See In Re Digimarc Corp. Derivative Litigation, 549 F.3d 1223 (9th Cir. 2008).

[45] 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 of SOX clawback enforcement actions appear in "Wells Fargo CEO's $41 million ranks only third among executive-pay clawbacks, forfeitures", *MarketWatch*, September 29, 2016.

[46] Executive Compensation Disclosure, 71 Fed. Reg. 78, 338 (Dec. 29, 2006) (altering Section 402 (b)(2)(viii) of Regulation S-K).

TARP clawback (2009)

In 2009, firms receiving public support through the Troubled Asset Relief Program (TARP) are required by the U.S. 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 is more effective to curb manipulation and misconduct 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 passes 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 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. Moreover, in many cases the recovery is impractical, and the legal bill may exceed the amounts to recover.[47] In any case, anecdotal evidence suggests that recovery is forgone in many cases, but clawbacks are still triggered after severe cases of misconduct, misstatements or misrepresentation. We can expect that clawbacks are here to stay and their enforcement will be more frequent given that most public firms acknowledge the possibility of recovering executive pay.

Disclosure of clawback policies in DEF 14A proxies

Here I describe how firms disclose their clawback policies in the proxy statements. 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."

[47] See "Sorry, I'm keeping the bonus anyway", *The New York Times*, March 13, 2005, and "Companies discover that it's hard to reclaim pay from executives", *The Wall Street Journal*, November 20, 2006.

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 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 concerning 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.[48]

The fraud appears to stem directly from the mantra of the 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 bogus accounts. After the scandal goes public, government officials and the public opinion push 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.

[48]More 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.

Stumpf testifies before the U.S. Congress and resignes after some resistance, while Tolsted leaves the company without severance pay. Moreover, the board of directors claws 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 quantities are sizeable for both executives in their absolute value and 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 seven times for the case of Tolsted.[49]

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 leads some legal authorities to request the Federal Reserve to oust all the members of the bank's board.[50]

B Proofs

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 $B/\bar{e} - \gamma(m) < 0$ 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 is unchanged with respect to the original contract from condition (2). The new contract reduces the expected compensation costs by $(1 - \bar{e})(1 - m)(1 - \beta)\varepsilon > 0$ and is feasible. Thus, the original contract cannot be optimal.

[49]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.

[50]See "As Wells Fargo's woes mount, its board may be on the firing line", *MarketWatch*, August 9, 2017.

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 $w'_{HL} = w_{HL} - \varepsilon$, with $\varepsilon > 0$ 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 $(1-\overline{e})m\varepsilon > 0$ 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 case 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

$$\begin{aligned}
&\overline{m}\big(w_H - w_L\big) + \overline{m}\beta w_{HL} > \gamma \\
&\overline{m}\big(w_H - w_L\big) + \overline{m}\beta(w_{HL} - \varepsilon) \leq \gamma
\end{aligned}$$

With $w_{LL} = 0$, the incentive compatibility constraint (3) can be rewritten as

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

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

$$(1-\overline{e})\overline{m}(w_H - w_L + w_{HL}) \ ,$$

which is positive since $w_{HL} > -(w_H - w_L)$ and $\overline{m}\big(w_H - w_L\big) + \overline{m}\beta w_{HL} > \gamma > 0$. 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 $w'_L = w_L - \varepsilon$, with $\varepsilon > 0$ arbitrarily small. Suppose first that the decision m is unchanged concerning 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 $(1-\overline{e})(1-m)\varepsilon > 0$ 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 $w_H > \frac{\gamma}{\overline{m}(1-\beta c)} + w_L - \varepsilon$. One can still design an alternative contract with $m = 0$ by setting

$w'_H = \frac{\gamma}{\overline{m}(1-\beta c)} + w_L - \varepsilon$. Then $w'_H - w'_L = \frac{\gamma}{\overline{m}(1-\beta c)} > 0$ implying that the new contract adds slack to the incentive compatibility constraint (3) since $w_H - w_L \leq \frac{\gamma}{\overline{m}(1-\beta c)}$, 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 $-1/\beta$ in all its domain. Then, the contract that minimizes the cost of incentive compensation pays $w_H = B/\overline{e}$ and zero elsewhere. From condition (2) the contract effectively induces no manipulation, $m = 0$, since $B/\overline{e} \leq \gamma/\overline{m}$. ■

Proof of Proposition 2

If $B/\overline{e} > \gamma/\overline{m}$ 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 $-(1-\overline{m})/\beta$ for $w_H > \gamma/\overline{m}$. Correspondingly, the isocost curves have slopes -1 and $-[1 + (1-\overline{e})\frac{\overline{m}}{\overline{e}}] < -1$. 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

$$w_H = \frac{\gamma}{\overline{m}} \text{ and } w_{HH} = \frac{1}{\beta}\left(\frac{B}{\overline{e}} - \frac{\gamma}{\overline{m}}\right) > 0 \; .$$

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

$$\begin{aligned} W_{S+L} &= \overline{e}\frac{\gamma}{\overline{m}} + \overline{e}\frac{1}{\beta}\left(\frac{B}{\overline{e}} - \frac{\gamma}{\overline{m}}\right) \\ &= B + \frac{1-\beta}{\beta}\left(B - \frac{\overline{e}\gamma}{\overline{m}}\right) \ . \end{aligned}$$

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 β 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, $\left(\frac{B/\overline{e}-\gamma}{1-\overline{m}}, 0\right)$. This contract induces manipulation since $\frac{B}{\overline{e}} \geq \frac{\gamma}{\overline{m}}$ implies that $\frac{B/\overline{e}-\gamma}{1-\overline{m}} \geq \gamma/\overline{m}$.

The expected compensation costs for shareholders are given by

$$\begin{aligned} W_S &= \left[\overline{e} + (1-\overline{e})\overline{m}\right]\frac{B/\overline{e}-\gamma}{1-\overline{m}} \\ &= \left(\overline{e} + \frac{\overline{m}}{1-\overline{m}}\right)\left(\frac{B}{\overline{e}} - \gamma\right) \end{aligned}$$

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

$$\begin{aligned} \left(\overline{e} + \frac{\overline{m}}{1-\overline{m}}\right)\gamma &\geq \frac{\overline{m}}{1-\overline{m}}\frac{B}{\overline{e}} \\ \frac{\gamma}{\overline{m}} &\geq \frac{\frac{1}{1-\overline{m}}}{\left(\overline{e} + \frac{\overline{m}}{1-\overline{m}}\right)}\frac{B}{\overline{e}} \end{aligned}$$

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

Proof of Proposition 3

Assume that $B/\overline{e} \leq \frac{\gamma}{(1-\beta\ell)\overline{m}}$. 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 $w_H = B/\overline{e}$ 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 $B/\overline{e} > \frac{\gamma}{(1-\beta\ell)\overline{m}}$. 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 $w_H \in [0, \gamma/((1-\beta\ell)\overline{m})]$ and $-(1-\overline{m}(1-\beta\ell))/\beta < -1$ for $w_H < \gamma/((1-\beta\ell)\overline{m})$. The isocost curves have slope $-[1+(1-\overline{e})\frac{\overline{m}(1-\ell)}{\overline{e}}] < -1$ 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

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

This contract has a compensation cost equal to

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

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

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

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

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

and total costs $W_{C,S} + \kappa$. ■

Proof of Proposition 5

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

$$\begin{aligned} W_{C,S} &= \overline{e}\frac{B/\overline{e} - \gamma}{1-\overline{m}(1-\beta\ell)} \\ W_{C,S+L} &= \frac{\overline{e}\gamma}{\overline{m}(1-\beta)} + \frac{1}{\beta}\left(B - \frac{\overline{e}\gamma}{\overline{m}(1-\beta)}\right) \end{aligned}$$

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

$$\begin{aligned}\frac{\overline{e}\gamma}{\overline{m}}+\frac{1}{\beta}\left(B-\frac{\overline{e}\gamma}{\overline{m}}\right)&\leq\frac{B-\overline{e}\gamma}{1-\overline{m}(1-\beta)}\\ \frac{1}{\beta}\left(B-\frac{\overline{e}\gamma}{\overline{m}}\right)&\leq\frac{B-\overline{e}\gamma}{1-\overline{m}(1-\beta)}\ .\end{aligned}$$

Rearranging the previous expression one gets to

$$\frac{B}{\overline{e}}\leq\frac{\gamma}{(1-\beta)\overline{m}}\ ,$$

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

$$F(B,\gamma,\overline{e},\overline{m},\beta)=\frac{\overline{m}}{1-\overline{m}}\frac{B}{\overline{e}}-\left(\overline{e}+\frac{\overline{m}}{1-\overline{m}}\right)\gamma-\frac{1-\beta}{\beta}\left(B-\frac{\overline{e}\gamma}{\overline{m}}\right)$$

which simplifies to

$$F(B,\gamma,\overline{e},\overline{m},\beta)=\frac{B}{\overline{e}}\left(\frac{\overline{m}}{1-\overline{m}}-\overline{e}\frac{1-\beta}{\beta}\right)-\left[\overline{m}\left(\overline{e}+\frac{\overline{m}}{1-\overline{m}}\right)-\overline{e}\frac{1-\beta}{\beta}\right]\frac{\gamma}{\overline{m}}\qquad\text{(B.2)}$$

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 $\frac{B}{\overline{e}}>\frac{\gamma}{\overline{m}}$.

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

$$\begin{aligned}\frac{\overline{m}}{1-\overline{m}}&\geq\overline{m}\left(\overline{e}+\frac{\overline{m}}{1-\overline{m}}\right)\\ \frac{1}{1-\overline{m}}&\geq\overline{e}+\frac{\overline{m}}{1-\overline{m}}\\ 1&\geq\overline{e}\end{aligned}$$

Then, since $\frac{B}{\overline{e}} > \frac{\gamma}{\overline{m}}$, F is negative only if the first term in parenthesis is negative, yielding

$$\beta < \widehat{\beta} = \frac{\overline{e}}{\overline{e} + \frac{\overline{m}}{1-\overline{m}}} \; .$$

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

$$\begin{aligned}
\frac{\partial F}{\partial B} &= \frac{1}{\overline{e}}\left(\frac{\overline{m}}{1-\overline{m}} - \overline{e}\frac{1-\beta}{\beta}\right) \\
\frac{\partial F}{\partial \gamma} &= \frac{\overline{e}}{\overline{m}}\frac{1-\beta}{\beta} - \overline{e} - \frac{\overline{m}}{1-\overline{m}} \\
\frac{\partial F}{\partial \beta} &= \frac{\overline{e}}{\beta^2}\left(\frac{B}{\overline{e}} - \frac{\gamma}{\overline{m}}\right) \; .
\end{aligned}$$

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

$$\begin{aligned}
\frac{\partial F}{\partial \overline{m}} &= \frac{B/\overline{e} - \gamma}{(1-\overline{m})^2} - \frac{1-\beta}{\beta}\frac{\overline{e}\gamma}{\overline{m}^2} \\
\frac{\partial F}{\partial \overline{e}} &= -\gamma - \frac{\overline{m}}{1-\overline{m}}\frac{B}{\overline{e}^2} + \frac{1-\beta}{\beta}\frac{\gamma}{\overline{m}} \; .
\end{aligned}$$

■

C Manipulation and costly deferrals: An explicit model

Here I provide a micro-foundation for $\beta < 1$ 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 to avoid outside interference.

Consider the following modification to the baseline model with $\beta = 1$. As in Holmström (1999), the manager has some talent η 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 η 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 $\overline{e} = \eta e^+ + (1-\eta)e^-$, 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

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

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, $v(\overline{m}) < v(0)$ (Gao and Zhang, 2016, Makarov and Plantin, 2015).[51]

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 must satisfy, on top of conditions (5) and (6), the retention condition[52]

$$w_H + w_{HH} \geq v(m) \ .$$

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.[53]

[51]For 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.

[52]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 $v(m)$.

[53]The results in Lemma 1 follow without loss in this version of the model.

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

$$\beta' = \frac{B/\bar{e} - \gamma/\overline{m}}{v(0) - \gamma/\overline{m}} \ .$$

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 $w_H \in [0, \gamma/\overline{m}]$ and $-(1-\overline{m}) > -1$ for $w_H > \gamma/\overline{m}$. Correspondingly, the isocost curves have slopes -1 and $-[1+(1-\bar{e})\frac{\overline{m}}{\bar{e}}] < -1$. Since $v(0) > B/\bar{e}$ the retention constraint will always bind when $m = 0$— or equivalently when $w_H \in [0, \gamma/\overline{m}]$— and the optimal contract will have a partly long-term structure with

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

or an exclusively short-term structure with

$$w_H = \frac{B/\bar{e} - \gamma}{1 - \overline{m}} \ \textit{and} \ w_{HH} = 0 \ .$$

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

$$\bar{e}v(0) = B + \frac{1-\beta'}{\beta'}\left(B - \frac{\bar{e}\gamma}{\overline{m}}\right) \ .$$

■

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 manger'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 κ 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 Data appendix

D.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 also merge using CUSIP codes to obtain a greater number of correct matches. 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` 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:

> "clawback," "clawed back," "claw back," "compensation recovery," "recovery of compensation," "recover compensation," "recover incentive," "recovery of incentive," "recovery of awards," "recover award," "recover incentive," "recoupment of incentive," "recoupment of award," "recoup incentive," "recoupment of compensation," "recoup compensation," "recoup awards," "recoup incentive," "recapture compensation," "recapture of compensation," "recapture of award," "recapture of incentive," "recapture incentive," "re-

capture award," "reductions of award," "reduction of award," "reductions of award," "reductions of incentive," "reduction of incentive."

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.

D.2 Computation of the wealth-performance sensitivities

The construction of the wealth-performance sensitivities, Δ_{Total}, Δ_S and Δ_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 the construction of the deltas for both reporting formats separately. 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 corresponding exercise price and expiration date. 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_vol_{it}.

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_divy_{it}.

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 per cent increase in stock price:

$$\Delta_{Options} = \text{“prccf”} \times e^{-bs\_divy \times t2m} \Phi \left(\ln(\text{“prccf”}/\text{“expric”}) + t2m \times \frac{r - bs\_divy + \frac{bs\_vol^2}{2}}{bs\_vol \times \sqrt{t2m}} \right)$$

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:

$$\Delta^{new}_{S,Options} = \sum_j \Delta_{Options,j} \times \text{“opts\_unex\_exer”}_j$$

Similarly, for unvested options:

$$\Delta^{new}_{L,Options} = \sum_j \Delta_{Options,j} \times \text{“opts\_unex\_unexer”}_j$$

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

Concerning 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 "expric," and the maturity of each tranche of options awarded in the current year "exdate." With this information, I 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

$$strike\_un = \text{“prccf”} - \frac{(\text{“opt\_unex\_unexer\_est\_val”} - ivnew)^{+}}{\text{“opt\_unex\_unexer\_num”} - numnewop}$$

Where *ivnew* is the intrinsic value of the newly-granted options, $(P - expric)^{+} \times numsecur$, 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* $\geq$"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

$$strike\_un = \text{“prccf”} - \frac{\text{“opt\_unex\_unexer\_est\_val”}}{\text{“opt\_unex\_unexer\_num”}}$$

If "opt_unex_unexer_num" $\leq$ *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 the total number of options. 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:

$$strike\_ex = \text{“prccf”} - \frac{\text{“opt\_unex\_exer\_est\_val”}}{\text{“opt\_unex\_exer\_num”}}$$

If "opt_unex_unexer_num" $\leq$ *numnewop* and *numnewop* $<$ "opt_unex_unexer_num" + "opt_unex_exer_num" I subtract the number of new grants from the denominator of the previous expression. If the value of new grants is greater than that of unexercisable grants, i.e., *ivnew* $>$ "opt_unex_unexer_est_val", I subtract this excess from the numerator. If *ivnew* $>$ "opt_unex_unexer_est_val" + "opt_unex_exer_est_val", the intrinsic value of new grants exceeds that of all existing grants so I assume that all existing exercisable options are always at the money. Thus, the strike price is calculated as

$$strike\_ex = \text{“prccf”} - \frac{(\text{“opt\_unex\_exer\_est\_val”} - (ivnew - \text{“opt\_unex\_unexer\_est\_val”})^+)^+}{\text{“opt\_unex\_exer\_num”} - (numnewop - \text{“opt\_unex\_unexer\_num”})}$$

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, $\Delta_{Options,ex}$ for exercisable options and $\Delta_{Options,un}$ 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 $delta\_ex$ and $delta\_ex$, defined by

$$\begin{aligned}
delta_ex &= numexop \times \Delta_{Options,ex} \\
delta_un &= (\text{“opt_unex_unexer_num”} - numnewop)^+ \times \Delta_{Options,un}
\end{aligned}$$

where

$$numexop = (\text{“opt\_unex\_exer\_num”} - (numnewop - \text{“opt\_unex\_unexer\_num”})^+)^+ \ .$$

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

$$\begin{aligned}
\Delta^{old}_{S,Option} &= delta_ex \\
\Delta^{old}_{L,Option} &= deltanew + delta_un
\end{aligned}$$

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

$$\begin{aligned}
\Delta_{S,Stock} &= \text{“stock_unvest_num”} \times \text{“prccf”} \\
\Delta_{L,Stock} &= (\text{“shrown_excl_opts”} - \text{“stock_unvest_num”}) \times \text{“prccf”}
\end{aligned}$$

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

$$\Delta_S^{old} = (\Delta_{S,Stock} + delta\_ex)/1000$$
$$\Delta_L^{old} = (\Delta_{L,Stock} + deltanew + delta\_un)/1000$$

for the old reporting format, with $\Delta_{Total}^{old} = \Delta_S^{old} + \Delta_L^{old}$. Similarly, for the new reporting format I compute

$$\Delta_S^{new} = (\Delta_{S,Stock} + \Delta_{S,Options}^{new})/1000$$
$$\Delta_L^{new} = (\Delta_{L,Stock} + \Delta_{L,Options}^{new})/1000$$

and $\Delta_{Total}^{new} = \Delta_S^{new} + \Delta_L^{new}$.

D.3 Variable definitions and descriptive statistics

In this appendix first I show results from descriptive univariate tests for forecasts-meeting and restate behavior. Lastly, I report results from descriptive univariate tests across samples of clawback adopters.

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. *Reported earnings* is the announced level of earnings per share. $Ln(1 + Forecast\ disp.)$ is the log of one plus the average dispersion of earnings across an executive's tenure. *Analysts* is the number of analysts producing earnings forecasts for each firm. $Big4$ takes a value of one if the audit firm is a Big 4 firm and zero otherwise. $Ln(Firm\ value)$ is the log of total firm value computed as in Edmans et al. (2009). Specifically, using Execucomp's terminology, it is defined as the sum of the market value of equity, $prccf \times shrsout$, plus the book value of debt, approximated by the difference between the value of assets and the value of common equity, $assets - commeq$. *Leverage* is defined as the ratio of the book value of debt and the market value of equity. *Stock returns* is the monthly average stock return in the fiscal year. *Stock return volatility* and *Dividend yield* are, respectively the volatility of monthly stock returns and the dividend yield, as computed in Appendix D.2. *Independent directors* is the number of independent directors on the board. $Ln(\Delta_{Total})$ is the log of the wealth-performance sensitivity. Δ_S/Δ_{Total} is the ratio of short-term, vested, incentives over total incentives. $Ln(\Delta_S)$ is the log of the wealth-performance sensitivity of vested compensation. $Ln(\Delta_L)$ is the log of the wealth-performance sensitivity of unvested compensation. $Ln(Total\ compensation)$ 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, forecasts-meeting and univariate tests. Table D.1 reports that forecasts-meeting is associated with more frequent restatements, less frequent reports of losses, lower reported earnings, lower leverage, lower forecasts dispersion, more analysts, lower stock return volatility, and lower dividends. Executives that exhibit forecasts-meeting receive steeper incentives, higher Δ_{Total}, receive relatively steeper short-term incentives, but lower total compensation. CEOs have longer tenures, but CEO turnover is more frequent. Similar implications follow from the results for restatement behavior, the main exceptions being that restating firms are followed by fewer analysts, are smaller, face lower returns, and lower stock return volatility. Still, executives receive relatively more short-term incentives than non-restating firms.

Table D.1: Meet and restatement behavior: Univariate tests

	(1)			(2)		
	Meet			Restate		
	0	1	Difference	0	1	Difference
Meet (0,1)				0.277	0.342	-0.065***
				[7,458]	[1,140]	
Restatement (0,1)	0.122	0.159	-0.037***			
	[6,141]	[2,457]				
Loss (0,1)	0.115	0.049	0.066***	0.081	0.095	-0.013
	[7,949]	[3,343]		[7,458]	[1,140]	
Reported earnings	1.637	1.249	0.387***	1.734	1.331	0.404***
	[7,949]	[3,343]		[7,458]	[1,140]	
Ln(1+Forecast disp.)	0.098	0.039	0.059***	0.088	0.076	0.012***
	[7,572]	[3,301]		[7,217]	[1,081]	
Analysts	10.299	11.601	-1.302***	11.168	9.960	1.208***
	[7,949]	[3,343]		[7,458]	[1,140]	
Big 4 (0,1)	0.926	0.921	0.005	0.919	0.914	0.004
	[6,141]	[2,457]		[13,465]	[1,908]	
Ln(Firm value)	14.806	14.820	-0.014	14.919	14.648	0.271***
	[7,928]	[3,336]		[13,387]	[1,903]	
Leverage	0.923	0.510	0.412***	0.976	1.031	-0.056
	[7,928]	[3,336]		[13,387]	[1,903]	
Stock returns	1.307	1.217	0.090	1.217	1.657	-0.440***
	[7,669]	[3,273]		[12,607]	[1,819]	
Stock return volatility	42.295	41.111	1.184***	40.712	43.333	-2.621***
	[7,949]	[3,343]		[13,465]	[1,908]	
Dividend yield	3.273	2.767	0.506***	3.377	3.289	0.088
	[7,949]	[3,343]		[13,465]	[1,908]	
Independent directors	7.047	6.826	0.221***	7.133	6.783	0.349***
	[5,904]	[2,584]		[9,789]	[1,353]	
Ln(Δ_{Total})	1.493	1.791	-0.298***	1.534	1.484	0.050
	[7,569]	[3,194]		[12,500]	[1,788]	
Ln(Δ_S)	0.856	1.209	-0.353***	0.904	0.900	0.004
	[7,533]	[3,203]		[12,448]	[1,790]	
Ln(Δ_L)	0.368	0.603	-0.235***	0.409	0.263	0.146***
	[7,480]	[3,188]		[12,274]	[1,768]	
Δ_S/Δ_{Total}	0.575	0.598	-0.023***	0.577	0.599	-0.023***
	[7,569]	[3,194]		[12,500]	[1,788]	
Ln(Total comp.)	7.289	7.223	0.066***	7.318	7.142	0.176***
	[7,926]	[3,330]		[13,418]	[1,900]	
CEO tenure	8.373	8.757	-0.384**	8.392	8.570	-0.178
	[7,927]	[3,319]		[13,411]	[1,897]	
CEO turnover	0.110	0.094	0.016***	0.100	0.098	0.002
	[7,927]	[3,320]		[13,412]	[1,897]	

This table reports the results from univariate mean tests across the sample of meet and restatement behavior in the 2002-2016 period. The size of each subsample is reported within brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Descriptive statistics: Clawback adoption. Table D.2 reports that clawback adopters, before clawback adoption, are more likely to embark in forecasts-meeting, are less likely to report losses, announce higher earnings per share, have higher forecasts dispersion, are followed by more analysts, and are more likely to have a Big 4 audit firm. Moreover, adopters are bigger, have lower leverage, higher stock returns, lower return volatility, lower dividend yields, and have more independent directors than non-adopters. Executives at adopting firms receive steeper incentives, both in its short-term and long-term component, although not in relative terms. Moreover, in adopting firms, executives receive a bigger pay and CEOs have shorter tenures, although lower probability of turnover.

Within the observations of clawback adopters, clawback adoption is associated with less frequent forecast-meeting and restatements, less frequent reports of losses, higher reported earnings and higher forecast dispersion. After the adoption, firms are followed by more analysts but are less likely to have a Big 4 audit firm. Moreover, firms adoption is associated on average with bigger size, higher leverage, lower stock returns and return volatility, higher dividend yields, and more independent directors on the board. The slope of executive incentives does not change after the adoption, but its time structure changes. In particular, clawback adoption is associated with a decrease in the slope of vested compensation and an increase in the slope of unvested compensation. All in all, the relative importance of short-term incentives decreases. Lastly, the adoption of a clawback is associated with an increase in the level of executive compensation, while the CEO turnover frequency increases.

Table D.2: Univariate tests: No clawback vs. Clawback

	(1)			(2)		
	Pre: Non-adopters vs. Adopters			Post		
	0	1	Diff	0	1	Diff
Meet (0,1)	0.304	0.332	-0.028**	0.332	0.242	0.090***
	[2,405]	[4,917]		[4,917]	[3,547]	
Restatement (0,1)	0.139	0.152	-0.014	0.152	0.088	0.064***
	[2,007]	[7,165]		[7,165]	[5,821]	
Loss (0,1)	0.142	0.096	0.046***	0.096	0.059	0.037***
	[2,405]	[4,917]		[4,917]	[3,547]	
Reported earnings	1.012	1.173	-0.161***	1.173	2.363	-1.190***
	[2,405]	[4,917]		[4,917]	[3,547]	
Ln(1+Forecast disp.)	0.068	0.076	-0.008***	0.076	0.093	-0.017***
	[2,252]	[4,739]		[4,739]	[3,484]	
Analysts	7.926	10.342	-2.416***	10.342	12.927	-2.585***
	[2,405]	[4,917]		[4,917]	[3,547]	
Big 4 (0,1)	0.835	0.937	-0.102***	0.937	0.925	0.012***
	[2,007]	[7,165]		[7,165]	[5,821]	
Ln(Firm value)	13.691	14.562	-0.872***	14.562	15.398	-0.836***
	[4,901]	[8,864]		[8,864]	[6,712]	
Leverage	1.268	0.973	0.295***	0.973	1.085	-0.112*
	[4,902]	[8,864]		[8,864]	[6,712]	
Stock returns	1.121	1.309	-0.188**	1.309	1.162	0.147**
	[4,731]	[8,478]		[8,478]	[6,240]	
Stock return volatility	50.096	44.122	5.974***	44.122	38.134	5.988***
	[4,927]	[8,876]		[8,876]	[6,760]	
Dividend yield	2.240	2.788	-0.548***	2.788	3.864	-1.076***
	[4,927]	[8,876]		[8,876]	[6,760]	
Independent directors	5.738	6.730	-0.992***	6.730	7.653	-0.923***
	[3,048]	[6,156]		[6,156]	[5,506]	
Ln(Δ_{Total})	0.975	1.528	-0.553***	1.528	1.561	-0.034
	[4,562]	[8,374]		[8,374]	[6,222]	
Δ_S/Δ_{Total}	0.607	0.604	0.003	0.604	0.525	0.078***
	[4,562]	[8,374]		[8,374]	[6,222]	
Ln(Δ_S)	0.371	0.919	-0.548***	0.919	0.862	0.057**
	[4,569]	[8,388]		[8,388]	[6,173]	
Ln(Δ_L)	-0.249	0.339	-0.587***	0.339	0.596	-0.257***
	[4,477]	[8,289]		[8,289]	[6,124]	
Ln(Total comp.)	6.733	7.121	-0.388***	7.121	7.619	-0.498***
	[4,897]	[8,829]		[8,829]	[6,758]	
CEO tenure	8.864	8.124	0.740***	8.124	7.950	0.175
	[4,877]	[8,839]		[8,839]	[6,750]	
CEO turnover	0.122	0.092	0.030***	0.092	0.130	-0.038***
	[4,878]	[8,840]		[8,840]	[6,751]	

This table reports the results from univariate mean tests across the samples of clawback adopters in the 2002-2016 period. The size of each subsample is reported within brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

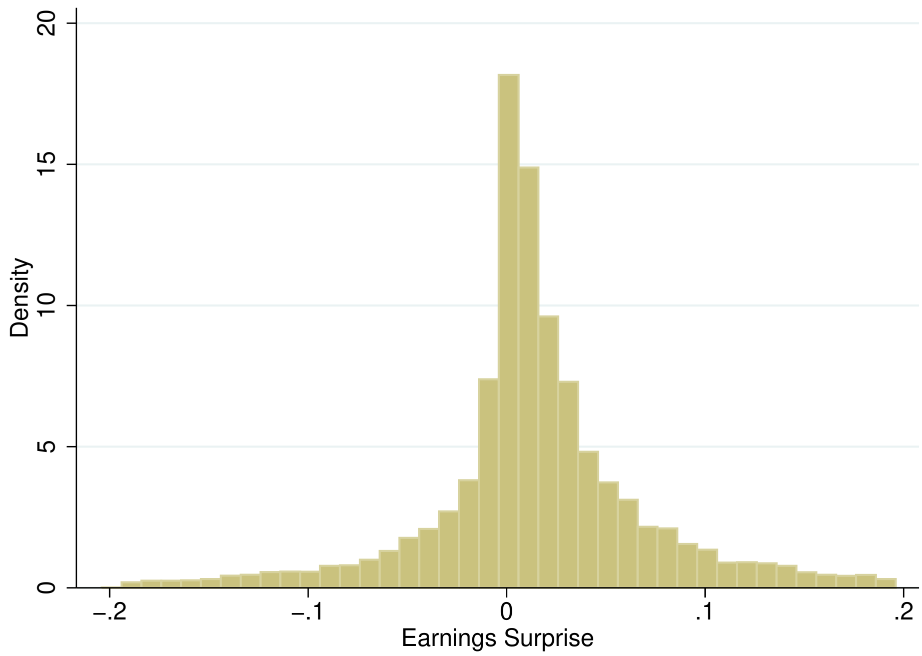

Figure E.1: Earnings surprise distribution for annual earnings per share announcements.

E Further empirical results

In this Appendix, first I provide evidence of the relationship between meet and restatement behavior and the relative steepness of short-term incentive compensation. Second, I report the first stage results from estimating equation (9). Lastly, I show robustness and additional tests for the results in Table 2.

E.1 Accounting manipulation and the structure of executive pay

Here I provide evidence on the relationship between the time structure of executive compensation and the tendency of executives to meet analysts' earnings forecasts and restate financials as proxies of accounting manipulation and weak internal monitoring in general. Figure E.1 depicts the histogram of earnings surprise bins, defined as the difference between the consensus forecast and the actual annual earnings announcement. The consensus forecast is the median forecasts across analysts recorded one month by IBES before the actual earnings announcements. The figure shows how earnings announcements are distributed asymmetrically around the consensus forecast. That is, earnings announcements cluster at the zero surprise and the $0.01 surprise bins.

What is the relationship between the structure of executive pay and the clustering of

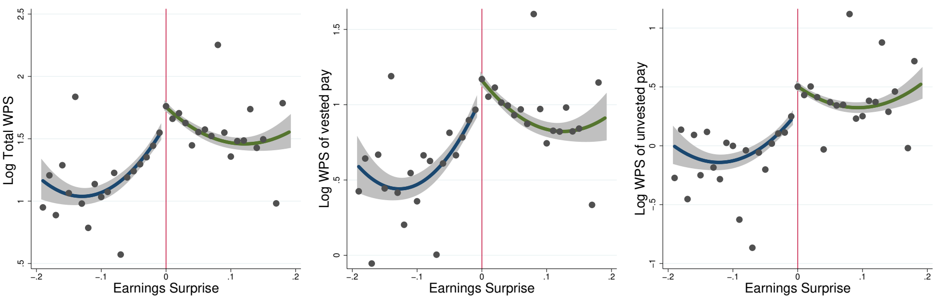

Figure E.2: Wealth-performance sensitivity and earnings surprises 1992-2016. The scatter plots show the mean (log) wealth-performance sensitivity of total (Δ_{Total}, left panel), vested (Δ_S, middle panel) and unvested (Δ_L, right panel) executive compensation across earnings per share surprise bins. The wealth-performance sensitivities are measured as of the end of the fiscal year, and earnings announcements take place at the beginning of the following fiscal year. Each scatterplot depicts fitted quadratic polynomials below and above the zero surprise threshold. Shaded areas correspond to 95% confidence intervals.

earnings announcements in the close-to-zero earnings surprise bin? In Figure E.2 I display the behavior of average wealth performance sensitivities across earnings surprise bins and corresponding quadratic polynomial fits below and above the zero surprise threshold. The left panel depicts the behavior of the wealth-performance sensitivity of executive pay, Δ_{Total}, which features a kink around the zero earnings surprise bin. The middle and right panels show that most of the kink of Δ_{Total} around the zero surprise bin can come from the vested part of compensation, Δ_S. The wealth-performance sensitivities are measured as of the end of the fiscal year, while earnings announcements take place mostly in the first quarter of the following fiscal year. Thus, the behavior of incentive compensation measures around the zero surprise bins suggests that managers can obtain a substantial boost in their compensation and have incentives to manage earnings in anticipation of a positive stock reaction to meeting (or beating) the earnings forecasts.

In Table E.1 I report the results from estimating logit models for the probability of forecasts-meeting and the probability of restating financials, conditional on the structure of (average) executive incentives and other firm-level characteristics. The results in columns (1)-(3) show that the slope of short-term incentives predicts future meet behavior, while the results for financial restatements are inconclusive.

In the analysis above I considered the relationship between *ex-ante* incentives and *ex-post* manipulation. Now I study the reverse relationship, i.e. do executives that display *ex-ante* greater likelihood of embarking in earnings manipulation do receive *ex-post* steeper short-term incentives? From the perspective of the theoretical model in the main text tolerating manipulation requires shareholders to provide steeper incentives than in the absence of manipulation, which is achieved by deferring manipulation. In order to

Table E.1: Probability of "meet-or-beat": Logit estimations

	(1)	(2)	(3)	(4)	(5)	(6)
	Meet	Meet	Meet	Restate	Restate	Restate
Ln(Δ_S)	0.110***	0.095***	0.106**	0.035	-0.027	-0.053
	(0.027)	(0.030)	(0.044)	(0.050)	(0.049)	(0.061)
Ln(Δ_L)	0.020	0.036	0.067	-0.017	-0.012	-0.000
	(0.027)	(0.025)	(0.045)	(0.051)	(0.060)	(0.067)
Ln(Firm value)	-0.065	-0.021	0.022	-0.032	0.002	0.023
	(0.039)	(0.039)	(0.056)	(0.043)	(0.044)	(0.052)
Reported earnings	-0.202***	-0.144***	-0.164***	-0.083***	-0.027	-0.034
	(0.032)	(0.031)	(0.035)	(0.029)	(0.027)	(0.033)
Ln(1+Forecast disp.)	-11.465***	-11.453***	-11.132***	-0.493	-0.325	-0.203
	(1.116)	(1.089)	(1.893)	(0.403)	(0.451)	(0.565)
Ln(Analysts)	0.378***	0.274***	0.245***	-0.110	-0.134*	-0.144
	(0.065)	(0.064)	(0.080)	(0.079)	(0.078)	(0.108)
Independent directors			0.010			0.002
			(0.020)			(0.026)
Big 4 (0,1)			-0.465***			-0.340*
			(0.132)			(0.202)
Observations	14,106	14,106	5,931	7,786	7,557	5,959
Pseudo R^2	0.092	0.104	0.103	0.007	0.050	0.053
Year FE	No	Yes	Yes	No	Yes	Yes

This table reports results from logit estimations for the probability of a firm meeting the earnings forecasts and filing a financial restatement for the period 1992-2016. Variable definitions appear in Appendix D. Columns (5)-(7) are restricted to observations in the 2002-2016 period. Standard errors clustered at the two-digit SIC industry level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

achieve the correct effort decision by the manager then shareholders must offer greater short-term rewards to the manager. Thus, I consider the *forecasts-meeting frequency* for each executive i in firm j observed after t periods, that is

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

Now I consider compensation variables that are measured as of fiscal year-end, while earnings announcements usually take place in the first quarter of the fiscal year. Thus, $Meet\ Freq$ is a predetermined variable from the perspective of executive incentives at fiscal year-end. I test the relationship between the structure of short-term incentives and manipulation incentives with the following specification:

$$Ln\left(\Delta_S\right)_{ijt} = \beta_0 + \beta_1 Meet\ Freq_{ijt} + \Gamma' X_{ijt} + \varepsilon_{ijt} \ . \tag{E.1}$$

X_{ijt} represents a set of controls, including firm size (Edmans et al., 2009), year fixed effects, and executive-firm 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. To rule out such interpretation, the controls X_{ijt} include the (log) average dispersion in earnings forecasts across the executive's tenure, which is also informative about the *detectability* of manipulation. Besides, I control for the actual earnings report to separate the explanatory power of forecasts-meeting from the level of reported earnings.

The coefficient β_1 in (E.1) is positive if executives that have a higher record of past earnings management display steeper short-term incentives. The coefficient measures the percentage change in the level of short-term incentives for an executive that meets the forecasts in every period. The identification of the effect relies on two assumptions. First, that past forecasts-meeting behavior is a pre-determined variable uncorrelated with omitted, unobservable, determinants of Δ_S. Second, that past forecasts-meeting behavior is a proxy for contemporaneous accounting manipulation tendencies. I rule out the possibility of sorting between firms and executives since I include executive-firm fixed effects, which allow comparing the compensation structure of the same executive with a different earnings management record.

I present the results in Table E.2, which confirm the prediction that managers with a record of past earnings management receive steep short-term compensation. Furthermore, results in columns (4) to (7) also confirm that a higher record of past restatements also translates into steeper short-term compensation. Table E.3 reports similar results when the ratio Δ_S/Δ_{Total} is used as a dependent variable in equation (E.1).

Table E.2: Executice compensation and past manipulation records. Dependent variable: Ln(Δ_S)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Meet Freq.	0.896***	0.416***	0.434***				0.509***
	(0.075)	(0.086)	(0.087)				(0.121)
Ln(Firm value)	0.464***	0.756***	0.770***	0.463***	0.729***	0.734***	0.729***
	(0.018)	(0.032)	(0.032)	(0.017)	(0.044)	(0.044)	(0.046)
Reported earnings	0.052***	0.047***	0.048***	0.047**	0.044***	0.045***	0.047***
	(0.018)	(0.011)	(0.011)	(0.018)	(0.011)	(0.011)	(0.011)
Ln(1+Forecast disp.)	-2.437***	1.035*	1.031*	-2.465***	0.176	0.201	0.494
	(0.520)	(0.546)	(0.520)	(0.556)	(0.566)	(0.549)	(0.570)
Ln(Analysts)			-0.044*			-0.008	-0.017
			(0.026)			(0.033)	(0.033)
CEO tenure			-0.006***			-0.006**	-0.006**
			(0.002)			(0.002)	(0.002)
Restate Freq.				0.649***	0.362**	0.373**	0.305**
				(0.162)	(0.151)	(0.149)	(0.149)
Observations	72,804	72,804	72,268	45,843	45,843	45,683	45,683
Adjusted R^2	0.243	0.387	0.383	0.221	0.383	0.381	0.383
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes			Yes			
Firm-Executive FE	No	Yes	Yes	No	Yes	Yes	Yes

This table reports results from estimations of equation (E.1) for executive-firm level observations for the period 1992-2016. The dependent variable is the percentage of total executive incentives arising from vested securities. Columns (4)-(7) are restricted to observations in the 2002-2016 period. Standard errors clustered at the two-digit SIC industry level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

All in all, the results suggest that accounting manipulation is related to executives receiving steeper short-term incentives, which is consistent with the model predictions. That is, shareholders must provide steeper short-term incentives when managers are more likely to manipulate to induce effort, i.e., more effective decision-making. At the same time, this relationship provides greater incentives for managers to embark on earnings manipulation *ex-post*, whenever managers have private information about firm performance below the forecasts.

The empirical results justify using meet behavior as an indicator of earnings manipulation and weak *ex-ante* monitoring. This is because (i) managers can accumulate vested securities after manipulating earnings or (i) shareholders anticipate the potential manipulation behavior and have to provide steeper incentives to induce effort. Additionally, if executives with greater meet tendencies tend to receive more short-term incentives, they have more reasons to continue with this behavior soon, confirming the first set of results

Table E.3: Executice compensation and past manipulation records. Dependent variable: Δ_S/Δ_{Total}

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Meet Freq.	0.154***	0.169***	0.163***				0.167***
	(0.008)	(0.019)	(0.019)				(0.025)
Ln(Firm value)	-0.015***	-0.031***	-0.035***	-0.014***	-0.026***	-0.031***	-0.033***
	(0.003)	(0.005)	(0.004)	(0.004)	(0.006)	(0.006)	(0.006)
Reported earnings	0.009***	0.009***	0.008***	0.009***	0.009***	0.009***	0.010***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Ln(1+Forecast disp.)	0.088**	0.452***	0.455***	-0.004	0.352***	0.345***	0.437***
	(0.035)	(0.090)	(0.092)	(0.060)	(0.092)	(0.094)	(0.100)
Ln(Analysts)			0.018***			0.022***	0.020***
			(0.006)			(0.007)	(0.007)
CEO tenure			-0.000			-0.001	-0.001
			(0.000)			(0.000)	(0.000)
Restate Freq.				0.160***	0.099***	0.103***	0.081**
				(0.028)	(0.032)	(0.031)	(0.030)
Observations	74,557	74,557	74,036	47,714	47,714	47,552	47,552
Adjusted R^2	0.078	0.080	0.081	0.076	0.076	0.078	0.085
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes			Yes			
Firm-Executive FE	No	Yes	Yes	No	Yes	Yes	Yes

This table reports results from estimations of equation (E.1) for executive-firm level observations for the period 2002-2016, where the ratio Δ_S/Δ_{Total} is the dependent variable, instead of Δ_S. Columns (4)-(7) are restricted to observations in the 2002-2016 period. Standard errors clustered at the two-digit SIC industry level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

illustrated in Figure E.2. The theoretical model shows this as the outcome of optimal contracting.

E.2 The effects of clawback adoption: Robustness

Table E.4: Effects of clawback adoption on executive compensation and earnings manipulation: Ordinary Least Squares

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Ln(Δ_L)	Ln(Δ_S)	Ln(Δ_{Total})	Δ_S/Δ_{Total}	Ln(Total comp.)	Meet (0,1)	Restatement (0,1)
Clawback	0.158*	-0.063	0.014	-0.040**	0.093**	0.044	-0.058*
	(0.084)	(0.097)	(0.070)	(0.020)	(0.041)	(0.049)	(0.033)
Clawback × Independent dir. 2002	-0.024**	0.001	-0.004	0.005*	-0.013**	-0.006	0.009**
	(0.012)	(0.013)	(0.009)	(0.003)	(0.006)	(0.007)	(0.004)
Observations	34,438	33,508	34,870	34,870	37,958	4,708	7,105
Control IV	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table reports the results ordinary least squares regressions of executive incentive measures and earnings manipulation proxies on clawback adoption for the 2002-2016 period. Control variables are log firm size, independent directors, Big 4 adit firm, leverage, stock returns, stick return volatility, and dividend yield. I instrument the control variables by their values measured as of 2002 interacted with year dummies. Variable definitions appear in Appendix D. Standard errors clustered at the firm level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E.5: First-stage results

	(1) Clawback (0,1)	(2) Clawback (0,1)
2nd-degree interlock clawback adoption	0.103***	0.081***
	(0.028)	(0.027)
Observations	33,670	31,854
F	13.519	9.285
Stock-Yogo 15% size critical value	8.960	8.960
Control IV	No	No
Year FE	Yes	
Industry × Year FE	No	Yes
Firm FE	Yes	
Firm-Executive FE	No	Yes

This table reports the first-stage estimation results. I instrument clawback adoption by the share of adoption across firms second-degree connected with each individual firm through the board interlock. I exclude firms that are in the same industry, defined at the two-digit SIC level. Control variables are log firm size, independent directors, Big 4 adit firm, leverage, stock returns, stick return volatility, and dividend yield, all measured as of 2002 and interacted with year dummies. I report the F statistic for the first-stage equation, namely, clawback adoption on the instrumental variable, and the corresponding critical value of Stock and Yogo (2005) for the corresponding Wald test that yields a 15% size. Variable definitions appear in Appendix D. Standard errors clustered at the firm level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E.6: Effects of clawback adoption on executive compensation and earnings manipulation: Direct effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Ln(Δ_L)	Ln(Δ_S)	Ln(Δ_{Total})	Δ_S/Δ_{Total}	Ln(Total comp.)	Meet (0,1)	Restatement (0,1)
Clawback	-0.161**	-0.357***	-0.099	-0.050**	-0.029	0.015	-0.053
	(0.079)	(0.080)	(0.090)	(0.024)	(0.053)	(0.063)	(0.033)
Observations	33,670	32,743	34,078	34,078	37,110	4,624	6,943
F 1st stage	13.519	11.675	13.076	13.076	15.031	7.656yields a 15% size	15.821
Stock-Yogo 15% size critical value	8.960	8.960	8.960	8.960	8.960	8.960	8.960
Control IV	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table reports the results from two-stage least squares regressions of executive incentive measures and earnings manipulation proxies on clawback adoption for the 2002-2016 period. I instrument clawback adoption by the share of adoption across firms second-degree connected with each individual firm through the board interlock. I exclude firms that are in the same industry, defined at the two-digit SIC level. Control variables are log firm size, independent directors, Big 4 adit firm, leverage, stock returns, stick return volatility, and dividend yield. I instrument the control variables by their values measured as of 2002 interacted with year dummies. SWF 1st stage denotes the Sanderson and Windmeijer (2016) weak-identification F statistic for the first-stage equation, namely, clawback adoption on the instrumental variable. I report the corresponding critical value of Stock and Yogo (2005) for the corresponding Wald test that yields a 15% size. The F statistics correspond to first-stage regressions where exogenous variables are partialled-out. Variable definitions appear in Appendix D. Standard errors clustered at the firm level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E.7: Effects of clawback adoption on executive compensation and earnings manipulation: Industry-year and firm-executive fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Ln(Δ_L)	Ln(Δ_S)	Ln(Δ_{Total})	Δ_S/Δ_{Total}	Ln(Total comp.)	Meet (0,1)	Restatement (0,1)
Clawback	0.551***	-0.516**	0.033	-0.136***	0.083	-0.114	-0.341***
	(0.169)	(0.214)	(0.141)	(0.047)	(0.113)	(0.119)	(0.084)
Clawback × Independent dir. 2002	-0.065***	0.064***	-0.008	0.023***	-0.018	0.015	0.029***
	(0.020)	(0.023)	(0.016)	(0.005)	(0.013)	(0.014)	(0.009)
Observations	31,854	31,034	32,303	32,303	35,421	4,624	6,943
SWF 1st stage	8.728	7.18	8.033	8.033	12.067	8.479	17.956
SWF 1st stage (2)	10.51	9.733	9.051	9.051	10.07	12.934	11.777
Stock-Yogo 15% size critical value	8.960	8.960	8.960	8.960	8.960	8.960	8.960
Kleibergen-Paap F	4.907	4.348	5.013	5.013	4.32	3.673	5.115
Stock-Yogo 15% size critical value	4.58	4.58	4.58	4.58	4.58	4.58	4.58
Control IV	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry× Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE						Yes	Yes
Firm-Executive FE	Yes	Yes	Yes	Yes	Yes		

This table reports the results from two-stage least squares regressions of executive incentive measures and earnings manipulation proxies on clawback adoption for the 2002-2016 period. I instrument clawback adoption by the share of adoption across firms second-degree connected with each individual firm through the board interlock. I exclude firms that are in the same industry, defined at the two-digit SIC level. Control variables are log firm size, independent directors, Big 4 adit firm, leverage, stock returns, stick return volatility, and dividend yield. I instrument the control variables by their values measured as of 2002 interacted with year dummies. SWF 1st stage and SWF 1st stage (2) denote, the Sanderson and Windmeijer (2016) weak-identification F statistics for each first-stage equation, namely, clawback adoption and its interaction with Independent directors in 2002 on the instrumental variable and its interaction with Independent directors in 2002. KPF refers to the Kleibergen and Paap (2006) weak-identification F statistic. I report for each F statistic the corresponding critical values of Stock and Yogo (2005) for the corresponding Wald test that yields a 15% size. The F statistics correspond to first-stage regressions where exogenous variables are partialled-out. Variable definitions appear in Appendix D. Standard errors clustered at the firm level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E.8: Effects of clawback adoption on executive compensation and earnings manipulation: Effects at most 2 years after adoption

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Ln(Δ_L)	Ln(Δ_S)	Ln(Δ_{Total})	Δ_S/Δ_{Total}	Ln(Total comp.)	Meet (0,1)	Restatement (0,1)
Clawback	0.539***	0.006	0.413***	-0.063	0.256**	-0.212**	-0.216***
	(0.144)	(0.193)	(0.134)	(0.050)	(0.121)	(0.108)	(0.082)
Clawback × Independent dir. 2002	-0.083***	-0.032	-0.058***	0.008	-0.036***	0.021*	0.023***
	(0.018)	(0.025)	(0.017)	(0.005)	(0.013)	(0.012)	(0.008)
Observations	25,886	25,463	26,085	26,085	28,718	3,594	5,392
SWF 1st stage	11.373	9.973	9.02	9.02	12.437	4.777	13.372
SWF 1st stage (2)	10.138	9.065	8.061	8.061	8.596	7.819	8.923
Stock-Yogo 15% size critical value	8.960	8.960	8.960	8.960	8.960	8.960	8.960
Kleibergen-Paap F	4.647	4.34	4.05	4.05	4.025	3.815	4.12
Stock-Yogo 15% size critical value	4.58	4.58	4.58	4.58	4.58	4.58	4.58
Control IV	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table reports the results from two-stage least squares regressions of executive incentive measures and earnings manipulation proxies on clawback adoption for the 2002-2016 period. I instrument clawback adoption by the share of adoption across firms second-degree connected with each individual firm through the board interlock. I exclude firms that are in the same industry, defined at the two-digit SIC level. Control variables are log firm size, independent directors, Big 4 adit firm, leverage, stock returns, stick return volatility, and dividend yield. I instrument the control variables by their values measured as of 2002 interacted with year dummies. SWF 1st stage and SWF 1st stage (2) denote, the Sanderson and Windmeijer (2016) weak-identification F statistics for each first-stage equation, namely, clawback adoption and its interaction with Independent directors in 2002 on the instrumental variable and its interaction with Independent directors in 2002. KPF refers to the Kleibergen and Paap (2006) weak-identification F statistic. I report for each F statistic the corresponding critical values of Stock and Yogo (2005) for the corresponding Wald test that yields a 15% size. The F statistics correspond to first-stage regressions where exogenous variables are partialled-out. Variable definitions appear in Appendix D. Standard errors clustered at the firm level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table E.9: Effects of clawback adoption on executive compensation and earnings manipulation: Hoberg and Phillips (2010, 2016) industry classification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Ln(Δ_L)	Ln(Δ_S)	Ln(Δ_{Total})	Δ_S/Δ_{Total}	Ln(Total comp.)	Meet (0,1)	Restatement (0,1)
Clawback	0.553***	-0.474***	0.028	-0.206***	0.407***	-0.227**	-0.327***
	(0.160)	(0.176)	(0.152)	(0.044)	(0.092)	(0.113)	(0.081)
Clawback × Independent dir. 2002	-0.085***	0.016	-0.022	0.021***	-0.054***	0.027**	0.028***
	(0.018)	(0.021)	(0.015)	(0.004)	(0.009)	(0.012)	(0.008)
Observations	34,411	33,484	34,844	34,844	37,921	4,707	7,099
SWF 1st stage	15.754	13.118	13.274	13.274	16.201	7.965	17.485
SWF 1st stage (2)	10.981	10.603	10.037	10.037	9.310	9.588	9.739
Stock-Yogo 15% size critical value	8.960	8.960	8.960	8.960	8.960	8.960	8.960
Kleibergen-Paap F	5.027	4.785	4.925	4.925	4.664	4.149	4.848
Stock-Yogo 15% size critical value	4.58	4.58	4.58	4.58	4.58	4.58	4.58
Control IV	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table reports the results from two-stage least squares regressions of executive incentive measures and earnings manipulation proxies on clawback adoption for the 2002-2016 period. I instrument clawback adoption by the share of adoption across firms second-degree connected with each individual firm through the board interlock. I exclude firms that are in the same industry, defined by the Hoberg and Phillips (2010, 2016) text-based network industry classification. The industry classification is time-varying and its granularity is equivalent to the two-digit SIC level. Control variables are log firm size, independent directors, Big 4 adit firm, leverage, stock returns, stick return volatility, and dividend yield. I instrument the control variables by their values measured as of 2002 interacted with year dummies. SWF 1st stage and SWF 1st stage (2) denote, the Sanderson and Windmeijer (2016) weak-identification F statistics for each first-stage equation, namely, clawback adoption and its interaction with Independent directors in 2002 on the instrumental variable and its interaction with Independent directors in 2002. KPF refers to the Kleibergen and Paap (2006) weak-identification F statistic. I report for each F statistic the corresponding critical values of Stock and Yogo (2005) for the corresponding Wald test that yields a 15% size. The F statistics correspond to first-stage regressions where exogenous variables are partialled-out. Variable definitions appear in Appendix D. Standard errors clustered at the firm level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.