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Essays in Executive Compensation

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Introduction

This doctoral thesis is made of three empirical research papers focused on executive compensation topics. The first chapter is a solo paper, while the second and third papers are co-authored with Antonio Parbonetti.

Executive compensation has become an internationally debated topic which attracted the interest of both academics and practitioners. In fact, the escalation in top executive pay and the perception that high salaries are not always coupled with outstanding performances (Murphy, 1999), have fueled an increasing interest in understanding the determinants and effects of incentives provided to top executives.

From a theoretical standpoint, executive compensation literature builds on agency theory, which provides the appropriate framework for examining the link between information systems, incentives, and behaviors. Agency relationships occur when one partner in a transaction (*the principal*) delegates authority to another (*the agent*) and the welfare of the principal is affected by the choices of the agent. Agency theory assumes that agents are self-interested and may attempt to maximize their interests at the expense of the principal. Compensation contracts are a pivotal tool used by principals to mitigate agency problems since they are designed in such a way to provide agents with incentives to act in the best interest of the principal.

Accounting scholars are interested in executive compensation from many perspectives, as summarized in Figure 1.

First, accounting discipline has analyzed executive compensation as a *corporate governance tool* (*Link 1*). In fact, setting top executive pay is an important task of the board of

directors, and many scholars investigated boards' effectiveness in providing executives with the appropriate level of incentives (Coughlan and Schmidt, 1985). Other scholars, instead, investigated the relationship between board's characteristics and CEO compensation (Kren and Kerr, 1997) or the effect of executive compensation on firm's value, future performance and investment decisions (Bens et al., 2002; Hanlon et al., 2003; Larcker et al., 2007).

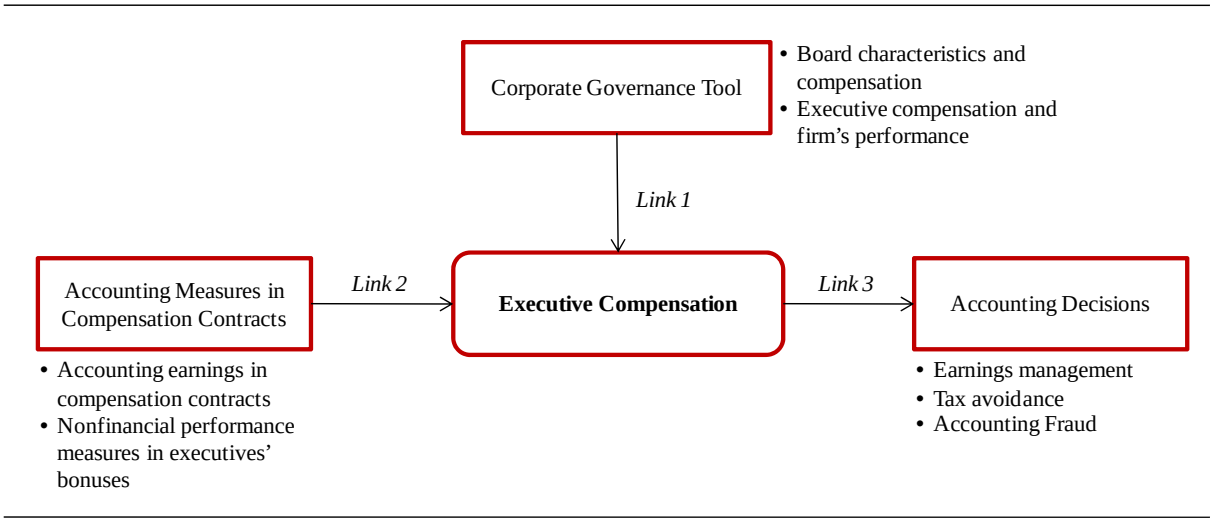

Figure 1. *Accounting Research and Executive Compensation*

Second, accounting scholars are interested in executive compensation because accounting measures can enter the design of compensation contracts (Link 2). In this line, researchers analyzed the use of accounting earnings in executives' contracts (Lambert and Larcker, 1987; Sloan, 1993), as well as the role of nonfinancial performance measures in executive compensation (Bushman et al., 1996; Ittner et al., 1997). Moreover, a wide research stream in management accounting literature investigated from this perspective the structure of executives' incentive schemes (Nagar, 2002). Specifically, this literature deals with the *stewardship role* of accounting: investors delegate decision making to managers and thus there is a demand for information about the actions that are taken for the purpose of controlling them (see Gjesdal, 1981).

Third, accounting is interested in executive compensation because the structure of compensation contracts can affect executives' accounting and reporting choices (*Link 3*). This is, probably, the most developed research stream in accounting literature within the executive compensation topics. Accounting choices that have been investigated in the literature as a consequence of executive compensation include: earnings management (Cheng and Warfield, 2005; Bergstresser and Philippon, 2006); corporate voluntary disclosure (Aboody and Kasznik, 2000); stock options' backdating (Heron and Lie, 2007); tax avoidance (Phillips, 2003); accounting fraud (Erickson et al., 2006); voluntary recognition of stock-based compensation expense (Aboody et al., 2004), just to name a few.

The three chapters of this thesis fit into this broad research framework and aim at empirically addressing three different research questions with reference to executive compensation.

The first chapter examines the first link of Figure 1, and answer to Bushman and Smith's (2001) call for research on compensation of executives other than CEOs. Specifically, using a sample of 586 firm-year observations over the period 2000-2009, I investigate the economic determinants and effects on shareholder value of the equity incentives given to the Chief Marketing Officer (CMO). The paper shows that, when companies invest more in marketing activities, they also give the CMO more equity incentives. I also find that CMOs' equity incentives are positively related to shareholder value and that this positive relationship is incremental to that between CEOs' incentives and firm value. Finally, I document that the positive impact of CMOs' equity incentives on firm value is not limited to those firms that invest more than the industry average in marketing, suggesting a strategic role for the CMO that is not linked only to the size of the marketing budget. These findings, which help to advance our understanding of the determinants and effects of executive compensation, have considerable practical implications. Specifically, I

challenge the mainstream view that the CEO's compensation captures all first-order effects and that the consequences of the compensation structure of executives other than the CEO are negligible. In fact, I document that the Chief Marketing Officer plays a central role in delivering shareholder value when she is properly incentivized. I also show that companies do not simply rescale the CEO's incentives when they decide how to incent the CMO, but they take a proactive role in detecting other economic determinants in order to set the appropriate level of incentives. Therefore, findings reported in the paper warn companies not to focus only on setting the CEO's incentives, while neglecting to incent other key top executives such as the CMO.

The second chapter, instead, examines the third link of Figure 1, and analyzes how CEO's equity incentives, risk incentives and career concerns drive the trade-off among earnings game strategies. Accounting literature documented that managers, in order to meet earnings targets, may engage in the numbers game by making choices among three non mutually exclusive strategies. Specifically, executives can alter reported earnings through real or accrual earnings management, and/or guide analysts' expectations downward in an attempt of avoiding negative earnings surprises. Previous literature showed that stricter regulation (i.e. the passage of the SOX), and firm's specific characteristics, influence the relative costliness of each earnings game strategy (Cohen et al., 2008; Zang, 2012). Nonetheless, literature fails to recognize that earnings game strategies are decided and executed by the CEO, who is going to consider, in the choice of how meeting/beating targets, also her personal costs and benefits. Using a sample of 4,471 quarterly observations, from 1,088 U.S. firms that are likely to have engaged in the earnings game over the period 2003-20010, I show that CEOs trade off the different earnings game strategies according to their personal benefits and costs. Specifically, I find that CEOs with high equity incentives and high career concerns engage less in real activity manipulations than executives with low

incentives, and substitute this earnings game strategy with other alternatives. Additionally, I document that firms using real activity manipulation to meet/beat targets have lower future market performances than firms using accrual earnings management or analysts' guidance. This result indicates that earnings game strategies that mostly rely on the alteration of real activities, impose very high costs on shareholders. CEOs appear to understand and anticipate this effect and, when their interests are aligned with those of shareholders in terms of equity incentives and career concerns, they avoid to choose real earnings management strategies. Overall, this chapter contributes to a well established research stream such as earnings management, by analyzing the trade-off among earnings game strategies from a new prospective.

Finally, the last chapter still examines the third link in Figure 1, but focuses the attention on CEO's compensation in the financial industry, which has attracted an increasing interest in recent years. In fact, executive compensation has been blamed of being one of the most fundamental causes of the recent credit crisis, providing CEOs with incentives to take too many big bets that turned out to be extremely costly (Solomon and Paletta, 2009). Specifically, the paper investigates the role of CEO's equity and risk incentives in boosting securitizations in the financial industry and in motivating executives to reduce the perceived risk while betting on it. Using a sample of US financial institutions over the period 2003-2009, the paper documents that CEOs with high equity incentives have systematically engaged in securitization transactions to a larger extent than CEOs with low incentives. It also shows that CEOs with high equity and risk-related incentives engaged in risky securitization activities and used securitization for transferring risks to outside investors. Finally, the paper shows that executives incentivized on risk provided outside investors with low quality disclosure about losses recorded on securitized loans, thus contributing to increase the opacity of securitization transactions undertaken. Overall, I interpret these results as evidence that

CEOs foresaw in securitizations under US GAAP an opportunity for hiding risks while bearing them and generating profits and cash flows because of the risks. In additional analyses, I document that before the collapse of the subprime mortgage market in 2007, financial institutions involved in the securitization of subprime loans largely over performed other banks in terms of market returns and earnings. On the contrary, starting from 2007 subprime securitizers have recorded worse performances than other financial institutions that were not involved in subprime securitization. This indicates that, by securitizing risky loans, CEOs were successful in boosting stock price and earnings, but the risks undertaken turned out to be extremely costly. This paper, therefore, adds to the large stream of research warning about possible side effects of equity compensation, and uncovers a determinant of securitization transactions that has been overlooked by previous literature.

Overall the three research papers included in this doctoral thesis address unexplored topics in executive compensation and aim at contributing to the current debate about the determinants and effects top executive compensation structure.

Introduzione

Il presente lavoro è costituito da tre articoli accademici, di natura empirica, focalizzati sul tema della remunerazione dei manager. Il primo capitolo è un paper a firma unica, mentre il secondo e terzo paper sono co-autorati con Antonio Parbonetti.

Il tema della remunerazione dei manager sta attraendo un crescente interesse nella comunità accademica e tra le imprese poiché il forte aumento dei livelli di remunerazione, e la percezione che tali incrementi spesso non siano seguiti da altrettanto eccellenti performance, stimolano sempre più a comprendere le determinanti e gli effetti degli incentivi forniti ai *top executive*.

Da un punto di vista teorico, la letteratura sul tema della remunerazione dei manager si fonda sulla teoria dell'agenzia, che fornisce l'appropriato schema teorico di riferimento per analizzare le relazioni tra informazioni, incentivi e comportamenti. Le relazioni di agenzia emergono quando, in una transazione, un soggetto (il principale) delega autorità ad un altro soggetto (l'agente), e l'utilità del principale è influenzata dalle scelte dell'agente. La teoria dell'agenzia assume che l'agente persegua i propri interessi personali e possa massimizzare la propria funzione di utilità a discapito del principale. I contratti di remunerazione sono, quindi, uno strumento fondamentale per alleviare i problemi di agenzia, poiché essi sono disegnati in modo tale da allineare gli interessi dell'agente con quelli del principale.

Gli studiosi di accounting sono interessati ai temi legati alla remunerazione dei manager da diverse prospettive, come illustrato in Figura 1.

In primo luogo, la letteratura di accounting ha analizzato la remunerazione dei manager come strumento di *governance (Legame 1)*. Infatti, la determinazione delle politiche

di remunerazione dei top manager è uno dei principali compiti del consiglio di amministrazione (*board*), e diversi autori hanno analizzato la capacità del board di fornire ai manager livelli appropriati di incentivi (Coughlan and Schmidt, 1985). Altri studiosi, invece, si sono focalizzati i) sulla relazione tra caratteristiche del consiglio di amministrazione e schemi di incentivazione dei manager (Kren and Kerr, 1997), e ii) sugli effetti della struttura di remunerazione degli executive sul valore aziendale, sulla performance futura e sulle decisioni aziendali di investimento (Bens et al., 2002; Hanlon et al., 2003; Larcker et al., 2007).

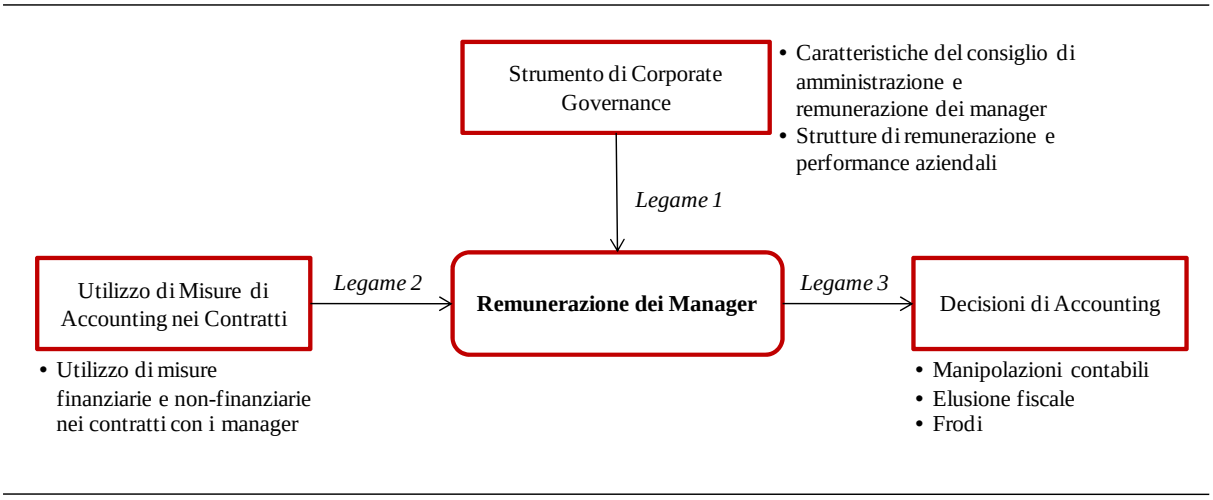

Figura 1. Accounting e Remunerazione dei Manager

In secondo luogo, gli studiosi di accounting si occupano di temi legati alla remunerazione dei manager perché le misure contabili sono elemento centrale dei contratti stessi (*Legame 2*). Diversi autori, pertanto, hanno analizzato il ruolo delle misure contabili nei contratti degli executive (Lambert and Larcker, 1987; Sloan, 1993), ma hanno anche approfondito l'utilizzo di misure non finanziare negli schemi di incentivazione (Bushman et al., 1996; Ittner et al., 1997). Inoltre, un'ampia letteratura in management accounting ha analizzato da questa prospettiva la struttura di incentivazione dei manager (Nagar, 2002). In

particolare, in questo contesto diventa rilevante il ruolo di *stewardship* dell'accounting: gli investitori delegano il processo decisionale ai manager e pertanto necessitano di informazioni riguardo le azioni intraprese da quest'ultimi per controllarli.

Infine, la struttura di remunerazione dei manager può influenzare le decisioni di accounting (*Legame 3*). Questo filone di ricerca è probabilmente il più sviluppato nella disciplina di accounting avente a riferimento le tematiche della remunerazione degli executive. Le scelte di accounting che sono state studiate in letteratura come possibili conseguenze della struttura di remunerazione dei manager sono: manipolazione degli utili contabili (Cheng and Warfield, 2005; Bergstresser and Philippon, 2006); disclosure volontaria (Aboody and Kasznik, 2000), retrodatazione delle opzioni (Heron and Lie, 2007); elusione fiscale (Phillips, 2003); frodi contabili (Erickson et al., 2006); contabilizzazione delle opzioni (Aboody et al., 2004).

I tre capitoli del presente lavoro di tesi sono contestualizzati nell'ambito del quadro teorico appena descritto e mirano ad analizzare empiricamente tre distinte domande di ricerca inerenti al tema della remunerazione dei manager.

Il primo capitolo esamina il primo legame illustrato in Figura 1, e cerca di colmare parte del vuoto presente in letteratura andando ad analizzare la remunerazione di manager diversi dall'amministratore delegato (CEO), come suggerito da Bushman and Smith's (2001). In particolare, utilizzando un campione di 586 osservazioni dal 2000 al 2009, lo studio analizza le determinanti economiche e gli effetti sul valore aziendale degli incentivi azionari forniti al Direttore Marketing (Chief Marketing Officer, CMO). I risultati mostrano che, quando le aziende investono maggiormente in marketing, forniscono al CMO maggiori incentivi azionari. Inoltre, lo studio rivela che gli incentivi azionari forniti al CMO sono positivamente correlati al valore aziendale e che tale effetto è incrementale rispetto a quello dovuto agli incentivi monetari del CEO. Infine, il capitolo rivela che l'impatto positivo sul

valore aziendale riconducibile agli incentivi azionari del CMO non è limitato esclusivamente alle aziende con elevati investimenti di marketing. Questo suggerisce che il CMO riveste un ruolo strategico nell'azienda che non è esclusivamente legato all'entità del budget di marketing. I risultati riportati nello studio hanno considerevoli implicazioni pratiche. In particolare, essi sono in contrapposizione con la tradizionale percezione che la remunerazione del CEO catturi tutti gli effetti rilevanti e che, quindi, sia di marginale importanza studiare la struttura di incentivazione di executive diversi dal CEO. Infatti, lo studio documenta che il CMO, quando propriamente incentivato, riveste un ruolo strategico chiave nel creare valore aziendale. Inoltre, i risultati suggeriscono che le aziende, nel determinare gli incentivi dei manager diversi dal CEO, non ridimensionano semplicemente la struttura di remunerazione dell'amministratore delegato, bensì cercano di identificare delle determinanti economiche rilevanti per definire l'appropriato livello di incentivi.

Il secondo capitolo, invece, si focalizza sul terzo legame rappresentato in Figura 1, e analizza come gli incentivi azionari, gli incentivi al rischio e i *career concern* del CEO influiscono sul trade-off tra le diverse strategie di *earnings management*. La letteratura di accounting ha documentato che, al fine di raggiungere determinati obiettivi di performance, i manager possono scegliere di 1) manipolare gli utili contabili utilizzando la flessibilità concessa dai principi contabili (*accrual-based earnings management*), 2) manipolare le decisioni di investimento dell'azienda (*real earnings management*), 3) abbassare le aspettative degli analisti per evitare di non raggiungere le loro stime (*analysts' expectation guidance*). La letteratura ha mostrato che una regolamentazione più severa, e caratteristiche intrinseche dell'impresa, influenzano il costo delle menzionate strategie di *earnings game* (Cohen et al., 2008; Zang, 2012). Tuttavia, non si è prestata la dovuta attenzione al fatto che la scelta della strategia di *earnings game* da utilizzare viene effettuata, in ultima istanza, dal CEO dell'azienda il quale considererà nella scelta anche i propri incentivi. Utilizzando un

campione di 4,471 osservazioni dal 2003 al 2010, il secondo capitolo mostra che il CEO sceglie quale strategia di *earnings game* utilizzare anche in funzione di costi e benefici personali. In particolare, i risultati indicano che i CEO con maggiori incentivi azionari e con più elevati *career concern*, utilizzano di meno le strategie di *real earnings management* e le sostituiscono con le altre due alternative. Inoltre, lo studio mostra che le aziende che utilizzano in misura maggiore il *real earnings management* registrano performance future di mercato significativamente inferiori a quelle aziende che invece utilizzano altre strategie di *earnings game*. Tale risultato suggerisce che quando i manager manipolano le decisioni di investimento dell'azienda, al solo fine di raggiungere alcuni target di performance, impongono alti costi agli azionisti. I manager sembrano comprendere ed anticipare questo effetto e, quando i loro interessi sono maggiormente allineati con quelli degli azionisti in termini di incentivi azionari e *career concern*, utilizzano in misura minore le strategie di *real earnings management*. In conclusione, il secondo capitolo contribuisce ad un filone di ricerca già ben sviluppato andando ad analizzare il trade-off tra le strategie di earnings game da una nuova prospettiva: quella dei manager.

Infine, l'ultimo capitolo continua ad esplorare il Legame 3 della Figura 1, ma si focalizza sulla struttura di remunerazione del CEO nel settore finanziario; tematica quest'ultima particolarmente dibattuta negli ultimi anni. Infatti, la struttura di remunerazione degli executive nel settore finanziario è stata accusata di essere una delle principali cause della recente crisi finanziaria, poiché avrebbe fornito ai manager incentivi ad assumere eccessivi rischi (Solomon and Paletta, 2009). In particolare, il capitolo analizza il ruolo degli incentivi azionari e degli incentivi al rischio nel motivare i CEO ad intraprendere operazioni di cartolarizzazione dei mutui, riducendo i rischi percepiti dagli investitori esterni ma, al contempo, scommettendo su di essi. Utilizzando un campione di istituzioni finanziarie statunitensi dal 2003 al 2009, lo studio documenta che i manager con elevati incentivi

azionari hanno sistematicamente cartolarizzato una quantità maggiore di mutui. I risultati indicano altresì che i manager con elevati incentivi azionari ed incentivi al rischio, sono stati maggiormente coinvolti in operazioni di cartolarizzazione di mutui *subprime*, utilizzando in tal modo lo strumento della cartolarizzazione per trasferire i rischi ad investitori esterni. Inoltre, lo studio documenta che i manager incentivati al rischio hanno fornito una *disclosure* di qualità peggiore agli investitori esterni ed hanno pertanto contribuito ad aumentare le asimmetrie informative. Nel complesso, le analisi svolte suggeriscono che i manager hanno intravisto nelle operazioni di cartolarizzazione dei mutui la possibilità di nascondere i rischi generati ed incrementare i profitti delle proprie istituzioni finanziarie. In analisi aggiuntive, il capitolo mostra che, prima del crollo del mercato dei mutui subprime avvenuto nel 2007, le istituzioni finanziare coinvolte nella cartolarizzazione dei mutui subprime hanno registrato performance significativamente superiori ai propri concorrenti. Tuttavia, una volta che la crisi finanziaria è emersa, tali istituzioni ne hanno subito le conseguenze in misura maggiore. Pertanto, i risultati suggeriscono che, grazie alla cartolarizzazione dei mutui subprime, i manager delle grandi istituzioni finanziarie statunitensi hanno avuto successo nell'incrementare i profitti delle proprie istituzioni; tuttavia ciò è avvenuto assumendo rischi eccessivamente elevati. Il capitolo, pertanto, contribuisce all'ampio dibattito in letteratura riguardo ai potenziali effetti distorsivi causati dalla struttura di remunerazione dei manager.

In conclusione, i tre articoli accademici che costituiscono la presente tesi di dottorato analizzano tre domande di ricerca attualmente inesplorate in letteratura e contribuiscono ad alimentare il dibattito sulle determinanti e sugli effetti della struttura di remunerazione dei manager.

Chapter 1

Chief Marketing Officer's Equity Incentives: Economic Determinants and Effects on Shareholder Value

1.1 Introduction

Many scholars have investigated the composition of top executive compensation and have studied how different structures of executive compensation influence firms' performance and value (Core et al., 2003; Fong, 2009; Hogan and Lewis, 2005; Murphy, 1985; Murphy, 1999; Wallace, 1997). Most contributions in the literature focus on the chief executive officer (CEO) because of the underlying assumption that studying CEO's compensation clarifies all first-order effects. This viewpoint has been challenged by a few studies (e.g., Bushman et al., 1995; Indjejikian and Matejka, 2009; Jiang et al., 2010; Kim et al., 2011) that investigate the compensation structure of some non-CEO executives, such as the chief financial officer (CFO). This paper examines the economic determinants and the effects on the firm's value of the compensation structure of the chief marketing officer (CMO), a top executive that, to the best of my knowledge, has never been studied. The marketing literature has documented theoretically (Srivastava et al., 1998; Srivastava et al., 1999) and empirically (Srinivasan and Hanssens, 2009) a strong and positive relationship between marketing activities and shareholder value. As a consequence, the CMO, who is in charge of managing all variables related to the marketing mix, is likely to play a central role in influencing the firm's performance. Therefore, I argue that considering the CMO's compensation is essential to

developing a complete picture of the effects of executive compensation on the firm's value. In fact, although there is a large body of literature that suggests the importance of marketing activities and processes in sustaining and creating firm's value, we know nothing about how the top executive in charge of managing these activities is incented. The purpose of this paper is to fill this gap by focusing on the equity incentives that have become executives' most important compensation component (Core et al., 2003). Using a sample of 586 firm-year observations over the period 2000-2009 and a two-stage Heckman model approach, the paper documents three important features of CMO's compensation. First, when a firm's *marketing intensity* increases, the CMO's equity incentives significantly increase. Second, CMO's equity incentives are positively related to shareholder value, and this positive relationship is incremental to that between the CEO's incentives and firm's value. Third, the positive impact of the CMO's equity incentives on the firm's value is not limited to firms that invest in marketing more than the industry average, which finding suggests a strategic role for the CMO that is not simply linked to managing the marketing budget. These results suggest that the CMO's compensation structure cannot be considered only a second-order effect, and its effects on the firm's value deserves to be analyzed: specifically, moving from the first to the second quartile of CMOs' equity incentives, the average Tobin's q increases by 7 percent. This effect is economically significant but is not too high to appear unrealistic. More important, this result is incremental to the positive effect of CEO's equity incentives on the firm's value that the literature has already documented.

This paper contributes to extant literature in several ways. First, it adds to the traditional research stream that investigates executive compensation and equity incentives. To the best of my knowledge, this paper is the first to analyze the structure and effect on value of the CMO's compensation in answer to Bushman and Smith's (2001) call for research on compensation of executives other than CEOs. Second, the paper adds to the literature that investigates the role of marketing in delivering shareholder value: given the established link

between marketing activities and shareholder value, the paper explores the effect on firm value of the incentives provided to the executive in charge of managing marketing processes. This paper is also linked to Nath and Mahajan's (2008) study, which investigates the effect on performance of the CMO's being in the top management team. Nath and Mahajan (2008) find no support for the hypothesis that the CMO's being in the top management team improves corporate performance, but by moving the focus of the analysis from the mere presence/absence of the CMO in the top management team to the CMO's compensation structure, I find strong support for the CMO's strategic role in the company. Finally, by showing that the positive effect on value of the CMO's equity incentives is not conditioned on the firm's marketing investments, this paper also supports the idea that marketing has a strategic role that goes well beyond simply organizing marketing campaigns and market research, so it provides support for the idea that marketing strategically contributes to the planning process and to the creation of market-based assets (Anderson, 1982; Srivastava et al., 1998).

1.2 Motivation and Related Literature

Equity incentives are among the mechanisms companies use most frequently to alleviate agency problems between managers and shareholders (Core et al., 2003; Lambert, 2001; Murphy, 1999). Equity incentives, which increase in value when the firm's stock price rises, are designed to incent managers to work to increase the stock price. Many studies have investigated the relationship between the level of executives' equity incentives and firm performance, but results are diverse (Core et al., 2003). Some authors (e.g., Frye, 2004; Hanlon et al., 2003; McConnell and Servaes, 1990; Morck et al., 1988) document a positive association between the CEO's equity ownership and firm performance, suggesting that CEOs with high equity ownership are closer to optimal incentive levels than CEOs with low equity holding. Other authors claim that, on average, equity incentive levels are set optimally, so a

positive relationship between the CEO's equity incentives and firm performance is not obvious (Core et al., 2003). Virtually everything we know about executives' incentives is based on the analysis of the CEO's compensation structure. A few studies (e.g., Indjejikian and Matejka, 2009; Jiang et al., 2010; Kim et al., 2011) investigate the compensation structure of the Chief Financial Officer (CFO) or that of business-unit managers (Bushman et al., 1995), but most contributions do not consider the effect of compensation of executives other than that of the CEO. The focus on the CEO is justified by the belief that the board of directors, and in particular the compensation committee, is likely to expend considerable effort in optimally setting the CEO's incentives, and the incentives for other top executives are set accordingly. Therefore, the CEO's compensation is supposed to explain all first-order effects, and the incremental effect of non-CEO executives' compensation is deemed insignificant.

It is surprising that the CMO's compensation structure and incentive level has never been investigated, particularly considering the number of contributions in the marketing literature that establish a positive and robust link between marketing processes and firm value. Two relatively recent research streams in marketing literature empirically investigate the contribution of marketing to the creation of value for shareholders[1]: one that analyzes marketing activities like advertising (Grullon et al., 2004; Joshi and Hanssens, 2004; McAlister et al., 2007; Srinivasan et al., 2009), promotions (Pauwels et al., 2004), distribution choices (Geyskens et al., 2002), and new product introduction (Chaney et al., 1991; Kelm et al.,1995; Pauwels et al., 2004; Sorescu et al., 2007; Srinivasan et al., 2009), and the other that focuses on marketing assets, such as: brand equity (Madden et al., 2006), customer equity (Gupta et al., 2004), customer satisfaction (Anderson et al., 2004; Fornell et

[1] Srinivasan and Hanssens (2009) offer an excellent literature review of these contributions. See also Guo (2002)'s contribution.

al., 2006), and product quality (Aaker and Jacobson,1994; Srinivasan et al., 2009; Tellis and Johnson, 2007). These contributions, which empirically document that marketing strategies play a core role in creating shareholder value, can be contextualized in the theoretical framework proposed by Srivastava et al. (1998, 1999), who argue that marketing creates shareholder value by i) accelerating cash flows; ii) enhancing cash flows by increasing revenues and reducing costs, working capital, and fixed investments; iii) reducing the risk associated with cash flows; and iv) increasing the firm's long-term value (terminal value). Thus, Srivastava et al. (1998, 1999) posit a powerful relationship between market-based assets (like customer and partner relationships), market performance, and shareholder value.

All of these contributions show that marketing plays a central role in creating shareholder value, so it is of interest to both academics and practitioners to clarify how companies incent their CMOs and the effect of the CMO's equity incentives on shareholder value.

1.3 Hypotheses Development

As Core et al. (2003) point out, the equity-based incentives of employees and executives below the CEO level have increasing less important roles as the managers' actions have increasing less effect on stock prices. This view is consistent with the well-known *informativeness principle* proposed by Holmstrom (1979), which proposes that any observable signal that reveals on the margin information about the level of a manager's efforts should be included in the contract. Specifically, it is useful to remunerate non-CEO executives using equity grants only if these managers can influence the stock price through their actions and decisions. If the manager has a role that doesn't allow him or her to have any significant impact on the stock price because there is a weak causal relation between his or her actions/decisions and the firm's value, the executive will not be motivated by holding equity in the firm. On the contrary, these firms could experience higher costs because they have to compensate managers for the risk they take when part of their fixed salary is substituted with

components like stock and option grants. CMOs should have more potential to influence the stock price in firms that invest more in marketing than in firms that invest less, so I expect that firms characterized by higher *marketing intensity* use equity compensation for their CMOs to a larger extent than firm that are not. In fact these firms are more likely to perceive stock price as an informative signal of CMO's efforts. Therefore, I hypothesize:

H1: As firms' marketing intensity increases, the CMO is given more equity incentives.

The second part of the analysis explores whether CMOs' equity incentives have a positive impact on firm value that is incremental to that of the CEO. Equity incentives align executives and shareholders' interests and lead executives to have a long term orientation since their wealth is tightly linked to the future value of the company. The marketing literature has established a positive link between marketing processes and firm value. To create market-based assets, the CMO must have a long-term orientation because these assets require large marketing investments in the current period that are rewarded only in the future (Srivastava et al., 1998, 1999). Therefore, only marketing managers who are focused on the company's future value will be willing to sacrifice current profits to investments in market-based intangible assets, while a CMO with a relatively short time horizon will prefer to invest in promotion activities with short-term payoffs. Such promotions have been shown to boost revenues only temporarily, without improving long-term financial performance and firm value (Pauwels et al., 2004). Anderson (1982) argues that marketing may also play a core role in the process of strategy formulation, in setting clear objectives, and in supporting a long-run orientation in the decision making process. When CMOs are incented based on the long-term value of the firm, they are likely to be willing to contribute to strategic development with potentially high benefits for shareholders. Therefore, I hypothesize:

H2: The level of the CMO's equity incentives is positively related to shareholder value, after controlling for the CEO's equity incentives.

1.4 Variable Measurement

Executives' Equity Incentives

As Core et al. (2003) emphasize, executives' incentives from stocks and options are properly measured only considering *portfolio* incentives, so newly granted restricted stocks and stock options are not sufficient for evaluating the incentives with which the executive is provided (Yermack, 1995). I measure CMOs' equity incentives (CMO_INCENTIVE) by means of the incentive ratio, as computed in Bergstresser and Philippon (2006, p. 519-520). This metric measures the power of a CMO's equity-based incentives as the dollar change in the value of the executive's stock and option holdings that would come from a one percentage point increase in the company's stock price (CMO_ONEPCT). This measure of incentive is then standardized by the amount of cash compensation (base salary and annual bonuses) the executive receives during the year. Using Execucomp data for the period 2000-2009, I compute the incentive ratio as follows:

$$CMO\_INCENTIVE_{i,t} = CMO\_ONEPCT_{i,t} / (CMO\_ONEPCT_{i,t} + CMO\_SALARY_{i,t} + CMO\_BONUS_{i,t}),$$

where

$$CMO\_ONEPCT_{i,t} = 0.01 * PRICE_{i,t} * (CMO\_SHARES_{i,t} + CMO\_DELTA_{i,t} * CMO\_OPTIONS_{i,t})$$

In this specification, PRICE is the fiscal year-end company share price, CMO_SHARES is the number of shares held by the CMO as of the fiscal year-end, CMO_OPTIONS is the number of options held by the CMO as of the fiscal year-end, and CMO_DELTA is an estimate of the delta of the CMO's option portfolio.

In order to get CMO_DELTA, I follow Core and Guay's (2002) methodology for estimating the delta of executives' option portfolios. CMO's options are divided into three groups, and separate estimates of the delta are computed. The first group is made by options awarded during the year; for these options Execucomp reports all necessary information for computing the sensitivity of stock options to a one percent change in stock price[2]. The second group is made by options awarded in previous years that are not yet exercisable, and the third group is made by options granted in previous years that are currently exercisable. For the second and third group of options, Core and Guay (2002) develop and empirically test a methodology for approximating the sensitivity of these options to stock price changes, since the necessary information for the calculation is not readily available. Core and Guay (2002) show that their proxy captures more than 99 percent of the variation in option portfolio value and sensitivity. Similar to Nath and Mahajan (2008), I deem an executive to be the CMO of the company if his or her title includes the term "marketing"[3] (Execucomp item "titleann"). Titles of these executives include, but are not limited to, CMO and Vice President Marketing.

We also compute CEO's equity incentives (CEO_INCENTIVE) using the same methodology above described but considering CEO's stock and option grants. Finally, we create a variable that computes the difference in equity incentives between the CMO and the other non-CEO executives (DIFF_OTH). The incentive ratio for the other non-CEO executives (OTH_INCENTIVE) is the median incentive ratio of all non-CEO and non-CMO executives for whom the company discloses compensation data in the proxy statement. The difference in equity incentives between non-CEO executives and the CMO is defined as:

$$DIFF\_OTH_{i,t} = OTH\_INCENTIVE_{i,t} - CMO\_INCENTIVE_{i,t}$$

[2] Appendix 1. A reports the formula used for computing the sensitivity of individual options to stock price changes.

[3] If a company, in a given year, has more than one top executive with the term "marketing" in the title I keep in the analysis the executive with the higher total compensation.

Shareholder Value

I measure shareholder value by means of Tobin's q, defined as the ratio between the market value of a firm's assets and their replacement cost. The Tobin's q is a metric of shareholder value commonly used in the accounting and finance literature (e.g., Daske et al., 2008; Lang and Stulz, 1993; Servaes, 1991), as well as in marketing and management literature (e.g., Rao et al., 2004; Simon and Sullivan, 1993; Youndt et al., 2004). Higher values of Tobin's q reflect differences in expected discount rates and/or differences in expected future cash flows or growth expectations. Following Daske et al. (2008) and Doidge et al. (2004), I compute the Tobins'q as (total assets – book value of equity + market value of equity) scaled by total assets.

Marketing Intensity

To measure marketing intensity, I first compute marketing investment as the annual amount of advertising and R&D expenditures and, following a common practice in marketing literature (McAlister et al., 2007), standardize this amount by the firm's annual sales. As McAlister et al. (2007) point out, scaling a firm's advertising and R&D expenditures by its sales rules out the alternative explanation that the effects documented are due to firm size. Thus, I compute my measure of interest as[4]:

$$MKTG\_INTENSITY_{i,t} = (ADV_{i,t} + R\&D_{i,t}) / SALES_{i,t}$$

where ADV is the annual advertising expenditure, R&D is annual R&D expenditure, and SALES is firm's sales, as disclosed in the Compustat dataset. Advertising expenditures

[4] Since all my conclusions are based on this metric I do not set missing advertising and R&D data to zero. In fact, for these observations, I cannot distinguish between zero values and not available information. This conservative research design choice is necessary for assuring the integrity of results.

include the cost of advertising media (i.e., radio, television, and periodicals) and promotional expenses, while R&D expenditures include all costs incurred during the year that relate to the development of new products or services. The focus on advertising and R&D expenditures is consistent with the fact that they represent two of the four marketing mix levers (i.e., promotion and product) available to the CMO for shaping the marketing strategy. This choice is also corroborated by previous marketing literature that has focused on advertising and R&D activities when analyzing the impact of marketing on the firm's value (e.g., Chaney et al., 1991; Grullon et al., 2004; Grullon et al., 2006; Joshi and Hanssens, 2004; Kelm et al.,1995; Mathur et al., 1997; Mathur and Mathur, 2000; McAlister et al., 2007; Pauwels et al., 2004; Sorescu et al., 2007; Srinivasan et al., 2009). Marketing activities like distribution and placement, even if they are part of the marketing mix, are not included in the measure of *marketing intensity* because of data availability, but the documented focus of the marketing literature on the variables included in the metric suggest that the first-order effects of the phenomenon under investigation should be captured by these variables.

Control Variables

The empirical analysis includes several control variables that have been commonly used in the literature as determinants of executive compensation.

CASH_CONS is the firm's cash constraints (Carter et al., 2007; Core and Guay, 1999; Dechow et al., 1996; Yermack, 1995), computed as the three-year average of [(Common and preferred dividends – cash flow from investing – cash flow from operations)/total assets]; VOLAT is the stock returns' volatility as a proxy for monitoring difficulty (Core and Guay, 1999), calculated as the standard deviation of monthly stock returns computed for the twelve preceding months; CAPEX is a proxy for investment opportunities (Smith and Watts, 1992), computed as the ratio between capital expenditures and annual sales; ROA is the firm's performance, calculated as operating income after depreciation divided by total assets

(Murphy, 1985); SIZE is the natural log transformation of the firm's total assets (Himmelberg and Hubbard, 2000; Jin, 2002); and DIV_YLD is the firm's dividend yield, computed as the average dividend yield over the three-year period ending the year prior to the year of interest (Carter et al., 2007).

When using Tobin's q as the dependent variable, I also control for the annual growth in sales (GROWTH) and for the level of leverage (LEV), computed as long-term debt over the book value of equity. Leverage and growth are usually included in the analysis of determinants of shareholder value.

Finally, I control for industry effects by defining the three macro industries to which my observations belong: the manufacturing industry (MANUFACTURING), the trade industry (TRADE), and the service and finance (SER_FIN) industry. MANUFACTURING is a dummy variable set to one if the firm's two-digit SIC code is between 20 and 39, and zero otherwise; TRADE is a dummy variable set to one if the firm's two-digit SIC code is between 50 and 59, and zero otherwise; and SER_FIN is a dummy variable set to one if the firm's two-digit SIC code is between 60 and 89, and zero otherwise.

1.5 Sample Selection

Table 1.1 summarizes the sample selection process that led to the final sample of 227 firms and 586 firm-year observations over the period 2000-2009. Beginning with the 17,799 firm-year observations in Execucomp database for the period 2000-2009 for which it is possible to identify a CEO, 1,245 firm-year observations with no full data on CEO compensation, an additional 14,561 firm-year observations with missing data on CMO compensation, an additional 1,323 firm-year observations with missing advertising and/or R&D expenditures, and an addition 84 firm-year observations with missing data for computing the control variables are deleted, resulting in a final sample of 586 firm-year observations representing 32

different two-digit SIC code industries. Table 1.2, instead, describes the final sample in terms of industry groups and years.

TABLE 1.1
Sample Selection

	# Obs.
Firm-year observations in Execucomp for the period 2000-2009 with an identifiable CEO	17,799
minus	
Firm-year observations with no data for computing CEO's incentive ratio	1,245
Firm-year observations with no data for computing CMO's incentive ratio	14,561
Firm-year observations with missing data on advertising and/or R&D expenditures	1,323
Firm-year observations with missing data on control variables	84
Final Sample	**586**
Unique Firms	**227**

TABLE 1.2
Sample Composition

Year	**# obs.**	**%**	**Industry Group**	**# obs.**	**%**
2000	30	5.09	Manufacturing	287	49.0
2001	45	7.64	Trade	163	27.8
2002	52	8.83	Service and Finance	136	23.2
2003	62	10.53	**Total**	**586**	**100.0**
2004	67	11.38			
2005	69	11.71			
2006	59	10.53			
2007	72	12.22			
2008	67	11.38			
2009	63	10.7			
Total	**586**	**100.0**			

1.6 Empirical Results

Descriptive Statistics

Table 1.3 presents descriptive statistics for the final sample. In order to reduce the undue influence of outliers, variables are winsorized at the 1st and 99th percentiles.

TABLE 1. 3
Descriptive Statistics

	N	Mean	SD	p25	Median	p75
Equity Incentives						
CEO_INCENTIVE	*586*	0.280	0.238	0.116	0.206	0.372
CMO_INCENTIVE	*586*	0.100	0.090	0.036	0.077	0.138
DIFF_OTH	*586*	0.009	0.080	-0.015	0.006	0.036
	N	**Mean**	**SD**	**p25**	**Median**	**p75**
Marketing Investment Intensity						
MKTG_INTENSITY	*586*	0.116	0.116	0.031	0.083	0.171
	N	**Mean**	**SD**	**p25**	**Median**	**p75**
Control Variables						
CASH_CONS	*586*	-0.015	0.093	-0.067	-0.019	0.026
VOLAT	*586*	0.141	0.079	0.084	0.121	0.167
CAPEX	*586*	0.056	0.058	0.023	0.038	0.069
ROA	*586*	0.075	0.112	0.031	0.085	0.137
SIZE	*586*	6.826	1.473	5.827	6.704	7.584
DIV_YLD	*586*	0.005	0.011	0.000	0.000	0.006
TOBIN_Q	*586*	2.192	1.208	1.319	1.840	2.690
LEV	*586*	0.319	0.881	0.000	0.050	0.498
GROWTH	*586*	0.098	0.229	-0.018	0.075	0.185

Variable definition in Appendix 1.B

The descriptive analysis shows that the CMO is, on average, provided with fewer equity incentives than the CEO (median equity incentives of 0.077 and 0.206, respectively[5]). This result is not unexpected since stock price is a particularly informative signal of the CEO's efforts and firms commonly use equity grants for compensating CEOs. The *marketing intensity* metric's median value of 0.083 indicates that, on average, firms invest in advertising and R&D at the rate of 8.3 percent of annual sales. Statistics on SIZE, ROA, and CASH_CONS show that the sample is made up of large and profitable firms with relatively low cash constraints, while Tobin's q values document that the sample firms' market value of assets average more than twice their replacement value, as proxied for by the book value of assets. All variables appear to be in reasonable ranges and to be comparable to those in similar studies.

[5] Wilcoxon signed rank sum test indicates that the difference is significant at 1% level.

Univariate Analysis

Table 1.4 shows the Pearson's correlation coefficients of the variables in the analysis. Consistent with H1, *marketing intensity* (MKTG_INTENSITY) is positively correlated with the CMO's equity incentives (CMO_INCENTIVE). The univariate analysis also shows that the CMO's equity incentives are positively related to shareholder value (TOBIN_Q), thus providing preliminary support for H2. However, these results are inconclusive with respect to the paper's research questions because they fail to rule out the possibility that the CEO's equity incentives are the only determinant of the CMO's incentives and of shareholder value. This alternative explanation is supported by the high correlation between the CEO's and the CMO's incentives and between the CEO's incentives and shareholder value. The multivariate analysis will address this issue by documenting the incremental effects.

Multivariate Analysis

To investigate H1, I propose the following OLS model with year fixed effects and robust standard errors clustered at the firm level:

$$\begin{aligned} CMO\_INCENTIVE_{i,t} = {} & \alpha_0 + \alpha_1 * MKTG\_INTENSITY_{i,t} + \alpha_2 * CEO\_INCENTIVE_{i,t} + \alpha_3 * \\ & CASH\_CONS_{i,t} + \alpha_4 * VOLAT_{i,t} + \alpha_5 * CAPEX_{i,t} + \alpha_6 * ROA_{i,t} + \alpha_7 * \\ & SIZE_{i,t} + \alpha_8 * DIV\_YLD_{i,t} + \alpha_9 * TRADE_{i,t} + \alpha_{10} * \\ & MANUFACTURING_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

An important concern that arises when estimating model (1) by OLS relates to the presence of sample selection bias. As Table 1.1 shows, many firm year observations are lost because of missing data on the CMO's compensation. In fact, the CMO must be one of the highest paid executives for his or her compensation to be available. It could be that the CMO in a given firm never enters this group of executives because his or her remuneration is not high enough or because the CMO is among the highest paid executives one year and not the next.

TABLE 1.4
Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12
1 CEO_INCENTIVE	1											
2 CMO_INCENTIVE	0.479***	1										
3 DIFF_OTH	-0.023	-0.425***	1									
4 MKTG_INTENSITY	0.049	0.121**	-0.071	1								
5 CASH_CONS	-0.052	-0.055	-0.011	0.120**	1							
6 VOLAT	-0.081*	-0.139***	-0.041	0.194***	0.300***	1						
7 CAPEX	0.174***	0.161***	-0.021	0.240***	0.175***	0.128**	1					
8 ROA	0.224***	0.195***	0.056	-0.424***	-0.446***	-0.391***	-0.069	1				
9 SIZE	0.194***	0.257***	0.105*	-0.187***	-0.077	-0.243***	0.071	0.230***	1			
10 DIV_YLD	-0.052	-0.137***	0.011	-0.224***	-0.070	-0.096*	-0.063	0.068	0.177***	1		
11 TOBIN_Q	0.429***	0.430***	-0.078	0.082*	-0.079	-0.046	0.116**	0.348***	-0.144***	-0.100*	1	
12 LEV	-0.079	-0.040	0.063	-0.057	0.033	-0.105*	0.031	0.000	0.166***	0.131**	-0.116**	1
13 GROWTH	0.180***	0.188***	-0.021	-0.025	0.103*	-0.088*	0.228***	0.255***	0.054	-0.108**	0.256***	-0.002

The table reports Pearson correlation coefficients. Variable definition in Appendix 1.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively.

This possibility increases the probability that the final sample has a selection bias. If the final sample is not representative of the whole population, results cannot be generalized and the analysis would lack external validity.

In order to correct for the potential presence of sample selection bias, I estimate all models using Heckman's (1979) two-step method. The Heckman analysis can adjust for sample selection bias based only on observable characteristics and cannot control for bias coming from unobservable characteristics that are not included in the selection equation. Since no model for detecting the selection equation is present in the literature, I propose the following parsimonious equation for modeling the probability of an observation's being included in the final sample:

$$SELECTION_{i,t} = \delta_0 + \delta_1 * NUM\_EXE_{i,t} + \delta_2 * MKTG\_INTENSITY_{i,t} + \delta_3 * ROA_{i,t} + \delta_4 * SIZE_{i,t} + \delta_5 * TRADE_{i,t} + \delta_6 * MANUFACTURING_{i,t} + \sum_{t=1}^{9} YEAR_{i,t} + \eta_{i,t}, \quad (S)$$

where *i,t* denotes the firm and year observation, SELECTION is an indicator variable that takes the value of 1 if the observation is included in the final sample and zero otherwise, and NUM_EXE is the number of executives for whom the company discloses compensation data. The other variables have already been defined. Data are retrieved from Execucomp and Compustat database. All available observations on Execucomp database over the period 2000-2009 with data for estimating (S) are used to implement the Heckman model. The overall sample for implementing Heckman's procedure is made up of 4,085 firm-year observations. Table 1.5 presents results of a firm-cluster adjusted probit model for (S). The model appears to be well-specified, with most variables statistically significant. The test of overall model significance strongly rejects the null hypothesis that all coefficients are jointly equal to zero (Prob > chi2 = 0.0002).

TABLE 1.5
Selection Equation

Dependent variable SELECTION	Coef. [Std. Err.]
Independent variables	
NUM_EXE	0.064**
	[0.027]
MKTG_INTENSITY	1.042***
	[0.399]
ROA	0.051
	[0.353]
SIZE	-0.098***
	[0.027]
TRADE	0.234*
	[0.133]
MANUFACTURING	0.087
	[0.110]
Constant	-0.960***
	[0.265]
YEAR DUMMIES	YES
N = 4,085	
Pseudo R2 = 0.0240	
Prob > chi2 = 0.0002	

The table reports results from the first-stage Heckman selection model. Variable definition in Appendix 1.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively.

Table 1.5 shows that, as expected, higher *marketing intensity* increases the probability that the observation is included in the analysis. Table 1.5 also shows that the CMO's compensation is more likely to be available when companies disclose compensation data for a larger number of executives than when they disclose data for a smaller number of executives. While firm performance does not influence the selection probability, firm size has a negative relationship to the selection variable. Finally, the coefficient on TRADE is positive and significant, suggesting that firms in the trade industry are more likely to disclose data on CMO compensation than is the finance and service industry (the control group). Table 1.6 presents results from model (1), estimated by using Heckman two-stage method.

TABLE 1.6
Economic Determinants of CMOs' Equity Incentives

	[1]	[2]
Dependent variable	Coef.	Coef.
CMO_INCENTIVE	[Std. Err.]	[Std. Err.]
Independent variables		
MKTG_INTENSITY	0.240***	0.233***
	[0.073]	[0.067]
CEO_INCENTIVE		0.058**
		[0.024]
CASH_CONS	0.008	0.026
	[0.026]	[0.031]
VOLAT	-0.049*	-0.056*
	[0.027]	[0.033]
CAPEX	0.047	0.028
	[0.040]	[0.059]
ROA	0.078	0.084
	[0.066]	[0.059]
SIZE	-0.008	-0.006
	[0.005]	[0.005]
DIV_YLD	-0.594***	-0.767***
	[0.194]	[0.215]
INVERSE MILLS RATIO	0.172***	0.156***
	[0.014]	[0.014]
TRADE	0.025	0.240*
	[0.025]	[0.130]
MANUFACTURING	0.006	0.091
	[0.020]	[0.104]
Constant	-0.191***	-1.006***
	[0.048]	[0.231]
YEAR DUMMIES	YES	YES
N	586	586
R^2	0.219	0.335

The table presents results from a firm cluster-adjusted regression model with sample selection. Variable definition in Appendix 1.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively.

The positive and significant coefficient on *marketing intensity* (MKTG_INTENSITY) indicates that, when companies invest more in marketing (i.e., advertising and R&D), the CMO is provided with more equity incentives, giving support to H1. That the Inverse Mills

ratio is highly significant suggests that the Heckman's correction for sample selection bias is necessary and that OLS coefficients would otherwise be biased.

The coefficient on the CEO's equity incentives is positive and significant, indicating that the CMO's and the CEO's equity incentives move in the same direction. Nonetheless, because the coefficient on *marketing intensity* is still significant after controlling for the CEO's equity incentives, the CEO's incentives are not the only determinant of the incentives the CMO gets. Coefficients from column 2 in Table 1.6 indicate that, *ceteris paribus*, moving from the first to the second quartile of the *marketing intensity* variable, mean (median) CMO equity incentives increase by 12 percent (16%), showing that the results documented are both statistically and economically significant.

The next part of the analysis determines whether *marketing intensity* is a driver of equity incentives that is unique to the CMO or whether it also drives the equity incentives of the other non-CEO executives. For this purpose we use the variable, previously defined, DIFF_OTH that computes the difference in equity incentives between the CMO and the other non-CEO executives. Negative values of DIFF_OTH indicate that the CMO's equity incentives are higher than those of other non-CEO executives. Therefore, if *marketing intensity* only drives the CMO's incentives or drives CMO's incentives to a larger extent than other executives' incentives, a negative coefficient on MKTG_INTENSITY should result when using DIFF_OTH as the dependent variable.

The results shown in Table 1.7 from model (1) estimated using DIFF_OTH as the dependent variable corroborate the support for H1, suggesting that the company's *marketing intensity* explains not only the CMO's equity incentives but also the difference between the CMO's incentives and those of the other non-CEO executives. Specifically, Table 1.7 indicates that when *marketing intensity* increases, companies increase the level of CMO's equity incentives but don't adjust the incentives of the other non-CEO executives proportionately.

TABLE 1.7

Economic Determinants of the Difference in Equity Incentives between the CMO and the other non-CEO Executives

	[1]	[2]
Dependent variable	Coef.	Coef.
DIFF_OTH	[Std. Err.]	[Std. Err.]
Independent variables		
MKTG_INTENSITY	-0.150**	-0.150***
	[0.060]	[0.058]
CEO_INCENTIVE		0.002
		[0.024]
CASH_CONS	-0.007	-0.007
	[0.034]	[0.035]
VOLAT	-0.039	-0.040
	[0.038]	[0.038]
CAPEX	-0.039	-0.040
	[0.058]	[0.063]
ROA	0.024	0.023
	[0.047]	[0.049]
SIZE	0.016***	0.016***
	[0.005]	[0.005]
DIV_YLD	-0.333	-0.332
	[0.279]	[0.274]
INVERSE MILLS RATIO	-0.098***	-0.098***
	[0.030]	[0.029]
TRADE	-0.045**	-0.045*
	[0.022]	[0.023]
MANUFACTURING	-0.013	-0.012
	[0.015]	[0.014]
Constant	0.109**	0.109**
	[0.055]	[0.054]
YEAR DUMMIES	YES	YES
N	586	586
R^2	0.045	0.051

The table presents results from a firm cluster-adjusted regression model with sample selection. Variable definition in Appendix 1.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively.

My research design assumes that a firm's *marketing intensity* is exogenous with respect to the CMO's equity incentives—that is, that a CMO can decide how to invest the marketing budget (e.g., long-term-oriented marketing campaigns vs. short-term promotion activities) based on

his or her incentive scheme, but cannot decide to spend more on marketing, thereby changing company's *marketing intensity* ratio. Therefore, in my research design the firm's *marketing intensity* is determined by the firm's corporate strategy and other industry-related characteristics while the choice of how to allocate marketing resources varies according to the CMO's equity incentives. Given the importance of this assumption for the results, the robustness check session uses an instrumental variable approach to check for possible endogeneity problems.

In investigating H2, which deals with the impact of the CMO's equity incentives on shareholder value, I fit the following firm cluster-adjusted regression models with sample selection and year fixed effects[6]:

$$\begin{aligned} TOBIN\_Q_{i,t} = {} & \gamma_0 + \gamma_1 * CMO\_INCENTIVE_{i,t} + \gamma_2 * CEO\_INCENTIVE_{i,t} + \gamma_3 * \\ & MKTG\_INTENSITY_{i,t} + \gamma_4 * VOLAT_{i,t} + \gamma_5 * CAPEX_{i,t} + \gamma_6 * ROA_{i,t} + \gamma_7 * SIZE_{i,t} \\ & + \gamma_8 * GROWTH_{i,t} + \gamma_9 * LEV_{i,t} + \gamma_{10} * TRADE_{i,t} + \gamma_{11} * MANUFACTURING_{i,t} + \\ & \theta_{i,t} \end{aligned} \quad (2)$$

where *i,t* denotes the firm and year observations and all variables are computed as previously described. Table 1.8 shows results from estimating model (2). The coefficient on CMO_INCENTIVE documents a positive and significant relationship between the CMO's equity incentives and shareholder value, suggesting that, when a firm provides the CMO with higher levels of equity incentives, the firm's value significantly increases. Column 2 of Table 1.8 indicates that the positive effect of the CMO's incentives on shareholder value is incremental to that of the CEO, thus providing support for H2. In particular, estimate results indicate that, *ceteris paribus*, moving from the first to the second quartile of CMOs' equity incentives increases the mean (median) Tobin's q by 7 percent (8%). As a consequence, the CMO's equity incentives are far from being a second-order effect.

[6] The selection equation used as first stage is the one defined in (S).

TABLE 1.8
CMO's Equity Incentives and Shareholder Value

	[1]	[2]
Dependent variable	Coef.	Coef.
TOBIN_Q	[Std. Err.]	[Std. Err.]
Independent variables		
CMO_INCENTIVE	5.045***	3.796***
	[1.107]	[0.939]
CEO_INCENTIVE		1.222***
		[0.312]
MKTG_INTENSITY	0.677	0.709
	[0.674]	[0.662]
VOLAT	1.595*	1.456*
	[0.834]	[0.759]
CAPEX	0.879	0.440
	[0.974]	[0.979]
ROA	4.256***	3.832***
	[0.877]	[0.898]
SIZE	-0.220***	-0.239***
	[0.041]	[0.042]
GROWTH	0.372	0.326
	[0.232]	[0.213]
LEV	-0.041	-0.016
	[0.050]	[0.048]
INVERSE MILLS RATIO	-0.192***	-0.199***
	[0.074]	[0.068]
TRADE	-0.475***	-0.340*
	[0.178]	[0.180]
MANUFACTURING	-0.330**	-0.253*
	[0.152]	[0.150]
Constant	2.758***	2.710***
	[0.403]	[0.385]
YEAR DUMMIES	YES	YES
N	586	586
R^2	0.413	0.452

The table presents results from a firm cluster-adjusted regression model with sample selection. Variable definition in Appendix 1.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively.

Finally, the last part of the paper examines whether the positive impact on the firm value of the CMO's equity incentives exists only in those firms that invest in marketing more than the industry average or whether the documented results hold for all firms. In order to shed light on this issue, the sample is divided between companies that invest in marketing more than the

industry average and those that invest less, with a dummy variable (HIGH)[7] taking the value of one (zero) if the firm's *marketing intensity* is above (below) the median marketing intensity of the industry, computed separately each year. After interacting CMO_INCENTIVE with this dummy, I fit the following model with sample selection[8], firm-clustered standard errors, and year fixed effects:

$$TOBIN\_Q_{i,t} = \pi_0 + \pi_1 * CMO\_INCENTIVE_{i,t} + \pi_2 * CMO\_INCENTIVE * HIGH_{i,t} + \pi_3 * CEO\_INCENTIVE_{i,t} + \pi_4 * HIGH + \pi_5 * VOLAT_{i,t} + \pi_6 * CAPEX_{i,t} + \pi_7 * ROA_{i,t} + \pi_8 * SIZE_{i,t} + \pi_9 * GROWTH_{i,t} + \pi_{10} * LEV_{i,t} + \pi_{11} * TRADE_{i,t} + \pi_{12} * MANUFACTURING_{i,t} + \theta_{i,t} \quad (3)$$

Table 1.9 shows results from model (3). Coefficients reported indicate that the CMO's equity incentives are positively associated with shareholder value both in *low marketing intensity* firms ($\pi_1>0$) *and* in *high marketing intensity* firms ($\pi_1+\pi_2>0$). The interaction term (π_2) is not statistically different from zero, so the positive effect of the CMO's incentives on firm value doesn't differ based on whether the company invests in marketing more or less than average in the same industry. This result, which suggests a strategic role of the CMO that goes well beyond simply managing marketing investments, is consistent with Anderson's (1982) seminal work, which indicates a core role of marketing in the process of strategy formulation, in setting clear objectives, and in supporting a long-run orientation in the decision making process. Srivastava et al. (1998) also point to a strategic role of marketing (and, consequently, of the CMO) that is not merely linked to the level of advertising and R&D expenditure. Finally, whether the marketing expenditure is above or below the industry median, the CMO may decide to engage in marketing activities that affect firm value either in the long term or in the short term. All of these observations are consistent with the CMO's equity incentives

[7] Results are qualitatively similar if I use a continuous variable instead of the dummy variable.
[8] In order to maintain consistency between the first and the second stage of the model I substitute in the selection equation the variable MKTG_INTENSITY with the dummy ABOVE.

having a positive relationship with shareholder value in both high-marketing intensity and low- marketing intensity firms.

TABLE 1.9

CMO's Equity Incentives and Shareholder Value: A Comparison between High vs Low Marketing Intensity Firms.

	[1]	[2]
Dependent variable	Coef.	Coef.
TOBIN_Q	[Std. Err.]	[Std. Err.]
Independent variables		
CMO_INCENTIVE	5.367***	4.067***
	[0.847]	[0.843]
CMO_INCENTIVE*HIGH	-0.251	-0.137
	[1.563]	[1.415]
CEO_INCENTIVE		1.210***
		[0.308]
HIGH	0.195	0.173
	[0.160]	[0.148]
VOLAT	1.552*	1.402*
	[0.846]	[0.775]
CAPEX	1.090	0.683
	[0.872]	[0.891]
ROA	4.068***	3.626***
	[0.865]	[0.880]
SIZE	-0.209***	-0.228***
	[0.041]	[0.043]
GROWTH	0.380	0.334
	[0.239]	[0.218]
LEV	-0.041	-0.017
	[0.049]	[0.047]
INVERSE MILLS RATIO	-0.220**	-0.232***
	[0.098]	[0.090]
TRADE	-0.686***	-0.562***
	[0.171]	[0.172]
MANUFACTURING	-0.422***	-0.350**
	[0.153]	[0.152]
Constant	2.921***	2.918***
	[0.439]	[0.418]
YEAR DUMMIES	YES	YES
*Ha: (CMO_INCENTIVE + CMO_INCENTIVE*HIGH) > 0*	*p-value: 0.0003*	*p-value: 0.0007*
N	586	586
R^2	0.412	0.450

The table presents results from a firm cluster-adjusted regression model with sample selection. Variable definition in Appendix 1.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively.

Therefore, while results from the first part of the paper show that companies tend to incent the CMO only when they invest more in marketing, results in this last set of analyses suggest that the positive effect on the value of the CMO's incentives is not limited to those firms with high *marketing intensity*. A possible alternative explanation is related to the fact that CMOs in *high marketing intensity* firms are nearer to the optimal level of incentives since they are provided with higher levels of equity incentives. Therefore, the potentially higher benefit of providing better incentives to the CMO in firms with *high marketing intensity* could be offset if CMOs in these companies already receive higher levels of equity incentives and are close to the optimal level of incentives.

1.7 Robustness Checks

This section describes several robustness checks performed to ensure that the results documented are not driven by choices made in the research design.

Marketing Intensity

In order to ensure that the measure of *marketing intensity* used in this paper is not driven primarily by differences in firm size, I scaled advertising and R&D expenditures by annual sales. Another approach is to scale marketing investments by total assets (McAlister et al., 2007). As Cheng and Chen (1997) point out, the choice of the scalar variable is not a trivial issue since it may change the results as well as their interpretation. Untabulated results show that using total assets as scalar leads to qualitatively similar results.

I also tried to disentangle the marketing intensity metric into its two components (i.e., advertising and R&D expenditures) in order to determine whether results are just driven by both or only one of them. Untabulated results obtained by estimating model (1) using the two metrics separately indicate that both are positively related to the CMO's equity incentives and

negatively related to the difference in incentives between other non-CEO executives and the CMO.

Fiscal Year-end Stock Price as Omitted Correlated Variable

It could be argued that there is a mechanical relationship between the CMO's equity incentives in year t and the Tobin's q computed at the end of the same fiscal year. In fact, analyzing how the CMO's incentives and Tobin's q are computed shows that both metrics include in their computations the company's fiscal year-end stock price. In order to address this issue, I augment equation (2) and (3) by including as an additional regressor the company's fiscal year-end stock price. If the potential mechanical relationship exists, this augmented model would control for it. Untabulated results show that, as expected, fiscal year-end stock price positively and significantly loads on Tobin's q, but all of the coefficients of interest maintain their sign, magnitude, and statistical significance.

Endogeneity

This section uses an instrumental variable approach to test for potential endogeneity between the CMO's incentives and the firm's *marketing intensity*. As an instrument for the firm's *marketing intensity*, I use the *marketing intensity* of the industry to which the company belongs, excluding the company itself[9]. The firm's *marketing intensity* is likely to be highly correlated with the industry's *marketing intensity*, while the *marketing intensity* of the whole industry is not influenced by the incentives of the firm's CMO. Supporting the choice of the industry's *marketing intensity* as a valid instrument, in the final sample the firm's and the industry's *marketing intensity* are correlated at 60 percent. Untabulated results from an IV approach confirm those presented.

[9] Industry is defined using the two digit SIC code.

Shareholder Value

Finally, I estimate models (2) and (3) using two different specifications of shareholder value. In a first robustness check I used as a proxy for shareholder value the *change* in Tobin's q with respect to the previous year and, in a second analysis, the Tobin's q computed at time (t+1) instead of at time (t). Untabulated results yield to results that are qualitatively similar to those reported in the main analysis, and all conclusions are unchanged.

1.8 Implications for Future Research and Practice

Using a sample of 586 firm-year observations over the period 2000-2009, this research sheds light on the economic determinants and effects on shareholder value of the CMO's equity incentives. Specifically, I find that firms with more *marketing intensity* give their CMOs more equity incentives and that CMOs' incentives are positively related to shareholder value. These findings have important implications for both theory and practice.

First, results documented in the paper challenge the mainstream view that the CEO's compensation captures all first-order effects and that the consequences of the compensation structure of executives other than the CEO are negligible. By focusing on a non-CEO executive who manages processes and activities that extant literature has documented are particularly important in creating shareholder value, the paper documents that non-CEO executives play an important role in delivering shareholder value when they are properly incented. Moreover, the paper shows that companies do not simply rescale CEOs' incentives when deciding how to incent other top executives but take a proactive role in detecting other economic determinants in order to set the appropriate level of incentives. These results are likely to open a wide research stream that analyzes the economic determinants of other non-CEO executives' incentives and their effects on firm value. This paper also complements the literature stream that investigates the relationship between marketing and firm performance by providing insights on the economic determinants and effects on value of CMO's incentives.

Findings reported in the paper warn companies not to focus only on setting the CEO's incentives while neglecting to incent other top executives properly. In particular, results suggest that companies should try to incent the CMO independently based on his or her marketing budget because the CMO can boost shareholder value on a way that is incremental to how the CEO does so. As a consequence, if the board of directors decides not to provide the CMO with sufficient equity incentives, it is likely that this decision will be suboptimal for shareholders. This aspect of the paper's findings is particularly important because academic research, by focusing on the CEO, could convey to practitioners the wrong message: that all firm efforts should be devoted to properly incenting only the CEO.

APPENDIX 1.A

Estimates of a stock option's sensitivity to stock price are calculated based on the Black-Scholes (1973) formula for valuing European call options, modified to account for dividend payout (Merton, 1973).

$$\textit{Option value} = [S\, e^{-dT} N(Z) - X e^{-rT} N(Z - \sigma T^{(1/2)})],$$

where

$Z = [\ln(S/X) + T\,(r - d + \sigma^2/2]/\sigma T^{(1/2)}$

N = cumulative probability function for the normal distribution

S = price of the underlying stock

X = exercise price of the option

σ = expected stock-return volatility over the life of the option

r = risk-free interest rate

d = expected dividend yield over the life of the option

The sensitivity with respect to a 1% change in stock price is defined as:

$$[\delta(optionvalue)/\delta(price)] * (price/100) = e^{-dT} N(Z) * (price/100)$$

APPENDIX 1.B

Variable	Definition
CEO_INCENTIVE	Dollar change in the value of CEO's stock and option holdings that would come from a one percentage point increase in the company stock price, standardized by cash compensation
CMO_INCENTIVE	Dollar change in the value of CMO's stock and option holdings that would come from a one percentage point increase in the company stock price, standardized by cash compensation
DIFF_OTH	Difference between the equity incentives of non-CEO and non-CMO executives w.r.t. CMO' equity incentives
MKTG_INTENSITY	Sum of annual advertising and R&D expenditure divided by total sales
CASH_CONS	Firm's cash constraints computed as the three-year average of [(Common and preferred dividends – cash flow from investing – cash flow from operations)/total assets]
VOLAT	Standard deviation of monthly stock returns computed for the twelve preceding months
CAPEX	Ratio between capital expenditures and annual sales
ROA	Operating income after depreciation divided by total assets
SIZE	Natural log transformation of the firm's total assets
DIV_YLD	Firm's dividend yield, computed as the average dividend yield over the three-year period ending the year prior to the year of interest
TOBIN_Q	Firm's Tobin's Q computed as (total assets – book value of equity + market value of equity) scaled by total assets
LEV	Long-term debt over the book value of equity
GROWTH	Percentage annual growth in sales

Chapter 2

CEO Incentives and the Trade-off among Earnings Game Strategies

with Antonio Parbonetti

2.1 Introduction

This paper analyzes how CEO's equity incentives, risk incentives and career concerns drive the trade-off among earnings game strategies[1].

Accounting literature documented that investors reward firms that meet or beat earnings expectations (Burgstahler and Dichev, 1997; Degeorge et al., 1999; Brown and Caylor, 2005). It is widely known that to meet earnings targets managers may engage in the "numbers game", making choices among three non mutually exclusive strategies. Specifically, executives can alter reported earnings through real or accrual earnings management (e.g. Schipper, 1989; Degeorge et al., 1999; Graham et al., 2005; Roychowdhury, 2006) and/or guide analysts' expectations downward in an attempt of avoiding negative earnings surprises (e.g. Bartov et al., 2002; Matsumoto, 2002).

Previous literature showed that stricter regulation (i.e. the passage of the SOX) and firm's specific characteristics influence the relative costliness of each earnings game strategy. Moreover, Zang (2012) and Cohen et al. (2008) show that when one earning management strategy is relatively more costly for the firm, executives engage in more of the other. However,

[1] In this paper we consider *numbers game* and *earnings game* as synonymous and refer to them as executives' practice of jamming a signal to the market by manipulating earnings or guiding analysts' expectations.

quite surprisingly, extant research fails to recognize that earnings game strategies are decided and executed by the CEO, who is going to consider in the choice of how meeting/beating targets also her personal costs and benefits. Therefore, we aim at investigating if and to which extent CEO's incentives shape the trade-off among i) real earnings management, ii) accrual-based earnings management and iii) analysts' expectation guidance.

Secondly, we turn to the investigation of the economic consequences of using the different earnings game strategies. The underlying intuition is that the three strategies analyzed are not equivalent in terms of costs imposed on the firm because real earnings management, contrary to the other two options, alters firm's operations and investing activities, making them to deviate from their normal course without an underlying economic reason. Thus, this earnings game strategy is likely to be the most costly for shareholders since it might impair firm's future value.

Using a sample of 4,471 quarterly observations, from 1,088 U.S. firms that are likely to have engaged in the earnings game over the period 2003-20010, we show that CEOs trade off the different earnings game strategies according to their personal benefits and costs. Specifically, we find that CEOs with high equity incentives and high career concerns engage less in real activity manipulations than executives with low incentives, and substitute this earnings game strategy with other alternatives. Additionally, we document that firms using real activity manipulation to meet/beat targets have lower future market performances than firms using accrual earnings management or analysts' guidance. This result validates our conjecture that earnings game strategies that mostly rely on the alteration of real activities impose very high costs on shareholders. CEOs appear to understand and anticipate these effects and, when their interests are aligned with those of shareholders in terms of equity incentives and career concerns, they avoid to choose real earnings management strategies.

This paper adds to several research streams in accounting literature. First, at the best of our knowledge this is the first study that investigates the effect of CEO's incentives on all earnings game strategies simultaneously considered. In fact, previous studies considered the different earnings game alternatives one by one and did not analyze the *trade-off* among them as a function of CEO's personal incentives (e.g. Pourciau, 1993; Wells, 2002; Cheng and Warfield, 2005; Bergstresser and Philippon, 2006). As long as executives consider earnings game strategies as substitute (Cohen et al., 2008; Zang, 2012), the focus on just one or two alternatives does not allow to understand and investigate the trade-off faced by CEOs when deciding how to meet/beat earnings targets. On the contrary, by jointly analyzing all earnings game strategies we are able to show how personal incentives motivate CEOs to substitute earnings game strategies in an attempt to maximize their personal utility. In this vein we add to the results in Matsumoto (2002), Cohen et al. (2008), Bartov and Cohen (2009) and Zang (2012), showing that reporting environment and firm-related characteristics are not the only determinants of earnings game strategies.

Second, we contribute to the recent research stream investigating the economic consequences of using the different earnings management strategies for meeting/beating benchmarks. Findings on this issue are controversial and conclusions are not unanimous (see Chen et al., 2010; Cohen and Zarowin, 2010; Gunny, 2010; Das et al., 2011). We contribute to this debate by focusing on the effects of engaging in the earnings game using real earnings management instead of managing accruals or guiding analysts' expectations, as well as by formally considering the presence of endogeneity between reporting strategies and firm's performance.

Third, we contribute to academic research investigating the effectiveness of executive incentives in solving agency problems (e.g. Coughlan and Schmidt, 1985; Core et al., 1999). Specifically, we show that equity and career incentives have the intended effect of making CEOs less prone to

engage in earnings game strategies that impair firm's future shareholder value, and thus are effective in aligning CEOs and shareholders' interests.

2.2 Background and Motivation

Accounting literature has argued that executives can play the earnings game using three not mutually exclusive strategies:

- *Real earnings management*. Managers engaging in real earnings manipulations make the firm to departure from its normal operational practices in order to mislead at least some stakeholders into believing certain financial reporting goals have been met in the normal course of operations (Roychowdhury, 2006, p. 337).
- *Accrual-based earnings management*. Executives can use the managerial discretion left by accounting principles to shift income overtime (Degeorge et al., 1999);
- *Analysts' expectation guidance*. Managers can avoid negative earnings surprises by guiding analysts' forecasts downward (Bartov et al., 2002; Matsumoto, 2002);

Previous literature analyzed how institutional changes and firm specific incentives influence the trade-off among earnings management strategies. Cohen et al. (2008) show that the passage of the Sarbanes-Oxley Act (SOX) triggered a shift from accrual to real earnings management, while Bartov and Cohen (2009) point out that in the post-SOX period, with respect to pre-SOX era, there is a decline in both accrual earnings management and downward earnings expectation management but an increase in real earnings management. These findings are consistent with the intuition that the SOX imposed high costs on accrual manipulation and constrained analysts' guidance, thus inducing executives to shift to real earnings management that is more difficult to

be detected. Zang (2012) focuses on accrual and real earnings management and investigates several firm's related characteristics that influence the relative costliness of these two earnings game strategies. Results in Zang (2012) indicate that real activity manipulation is constrained by firms' competitive status in the industry, financial health, scrutiny from institutional investors and tax consequences of manipulation.

In a similar vein, Matsumoto (2002) analyzes the trade-off between accrual-based earnings management and analysts' expectation guidance and suggests that firm characteristics play a role in how companies meet analysts' expectations. Overall, these contributions suggest that executives trade off earnings game strategies considering the relative costs and benefits.

A related research stream investigated the relationship between CEO's incentives and firm's decisions to manipulate earnings. For instance, Bauman and Shaw (2006) and Cheng and Warfield (2005) document a positive relationship between equity-based compensation and the probability that the firm meets analysts' targets. Bergstresser and Philippon (2006) show that the use of discretionary accruals to manipulate reported earnings is more pronounced in firms where CEO's total compensation is more closely tied to the value of stocks. In the same vein, Grant et al. (2009) find that CEOs risk-taking incentives are positively related to income smoothing. Pourciau (1993), instead, focuses on CEO's turnover and shows that incoming executives manage accruals in a way that decreases earnings in the year of the executive change and increases earnings the following year. Moreover, results in Pourciau (1993) indicate that departing executives record accruals and write-offs that decrease earnings during their last year of tenure. Consistently with these findings, Wells (2002) reports results supporting the notion that new CEOs engage in an earnings bath. Overall, findings from this strand of literature suggest that CEO's personal incentives, both monetary and non-monetary, play a core role in firms' decision of whether playing the numbers game.

Despite the several mentioned contributions that analyze the relationship between CEO's incentives and earnings management, there is a lack of evidence about *how* CEO's incentives shape the *trade-off* among the *different* earnings game strategies. This lack of evidence is particularly important because earnings game strategies are decided and executed by the CEO of the company who, most likely, is going to consider in the choice among the different options also her personal costs and benefits.

Bauman et al. (2005) partially fill this gap providing evidence that, in the pre-SOX era, stock option compensation affects positively earnings guidance and negatively accrual-based earnings management, but it is still unclear the role of CEOs incentives in the post-SOX era on earnings game strategies. Similarly, Demers and Wang (2010) analyze the impact of CEO's age on accrual and real earnings management but their study does not model a trade-off among earnings game strategies. Moreover, previous researches suffer a major limitation: the different numbers game strategies are considered one by one and there is not an attempt to analyze the *trade-off* among them as a result of CEOs incentives. Therefore, in this paper we analyze the *trade-off* among accrual-based earnings management, real activity manipulation and analysts' expectation guidance, jointly considered, as a result of CEOs' incentives.

2.3 Testable Predictions

It's well recognized that the intended effect of all the three earnings game strategies analyzed in this paper is to help firms to meet/beat benchmarks, when they are not able to do so in the normal course of their business operations. Nonetheless, the different strategies have several side effects that are likely to affect their costliness to the CEO according to her personal incentives. In the following, we first analyze the main side effects of each earnings game strategy and, secondly,

we discuss how these side effects impact on CEO's incentives and might influence their final choice about which strategy to use.

Side effects of earnings game strategies

We conjecture that among all earnings game strategies available to executives to meet/beat targets, real earnings management is, by far, the most costly option for the firm. In fact, real earnings management modifies firm's operations making them to divert from their normal course without an underlying economic reason. Evidences reported in Graham et al. (2005), indicate that when executives engage in real earnings management they burn real cash flows and forgo projects with positive net present value. Specifically, results from Graham et al. (2005)'s survey indicate that only the 50% of managers interviewed would take a project that increases shareholder value if this would mean to miss consensus earnings. Moreover, the 80% of survey participants reported that they would decrease discretionary spending on R&D, advertising, and maintenance to meet an earnings target, and more than half stated that they would delay starting a new project to meet a benchmark. As a consequence, the primary side effect of real earnings management practices is to impair the value of the firm and its ability to compete and create shareholder value in the next future, because of current suboptimal investment choices. A second side effect of real earnings management consists in decreasing discretionary investments which are risky and volatile by nature and that could enhance stock price volatility in the future. Specifically, real manipulations reduce firms' possibility to bet on risky investment policies, such as investing in R&D projects. Therefore, real manipulations could potentially decrease firm's future stock price volatility.

Even if accrual-based earnings management, contrary to real earnings management, does not have any cash flow effects and does not modify firm's operations, it imposes anyway risks and

costs on the firm, especially after the passage of the SOX in 2002. In fact, after the SOX, accrual manipulations are more likely to draw auditors' and regulators' scrutiny with the subsequent risk of incurring into formal sanctions, adverse publicity and legal costs in the case of questionable financial reporting. Academic research and the popular press argued that it became particularly costly for firms to engage in accrual-based earnings management activities in the Post-SOX period because of increased regulatory and auditing scrutiny, and because of the more stringent enforcement for securities regulation violations (Cohen et al., 2008; Bartov and Cohen, 2009). The increase in fines and regulatory scrutiny implies that the expected penalty for aggressive financial reporting has become greater (Lobo and Zhou, 2006). Therefore, the primary side effect of accrual-based earnings management is to impose potential costs and risks on the firm, even if these costs are likely to be less detrimental for firm's future value than those imposed by real earnings management because they do not affect firm's operations.

Finally, analysts' guidance does not encompass a manipulation of reported earnings but acts on analysts' expectations about firm's future earnings. Therefore, this earnings game strategy neither interfere with firm's business operations, nor alter accounting numbers reported to external investors. Thus analysts' guidance strategies leave untouched both firm's operations and financial statements. Nonetheless, when executives guide analysts provide them with additional information about firm's future prospects, and in doing so they contribute to decrease asymmetry information in the market among investors and analysts. As a consequence, this earnings game strategy does not threaten firm's value but might decrease stock price volatility.

CEO's incentives and earnings game strategies

Our predictions are rooted in the assumption that the above mentioned side effects make the three earnings game strategies differently costly for CEOs according to their personal incentives.

Specifically, we consider three types of CEO's incentives: equity incentives, risk related incentives and career concerns.

Equity incentives are defined as the change in the value of the executive's portfolio of stocks and options due to a variation in stock price (Murphy, 1999; Core et al., 2003). By motivating executives to increase stock price, equity incentives aim at aligning CEO's interests with those of shareholders, thus moderating principal-agent problems (Core et al., 2003). In fact, CEOs with high equity incentives are more concerned than low incentivized executives about the long-term value of the company which, under efficient market hypothesis, is readily incorporated in the stock price. As a consequence, given the discussed side effects of real manipulations, we expect that real earnings management is the most costly strategy for CEOs with high equity incentives. Similarly, given the risks linked to accrual-based earnings management in the post-SOX period, we expect that CEOs with high equity incentives are also reluctant to manipulate reported earnings, even if we expect they would prefer to manipulate accruals rather than real activities. On the contrary, since analysts' expectation guidance does not produce outcomes that might impair the future value of the company, we conjecture that CEOs with high equity incentive prefer to use this earnings game strategy and we posit the following hypotheses:

H1a: *CEO's with high equity incentives prefer to guide analysts' expectations rather than manage real operations*

H1b: *CEO's with high equity incentives prefer to guide analysts' expectations rather than engage in accrual-based earnings management*

H1c: *CEO's with high equity incentives prefer to engage in accrual-based earnings management rather than manage real operations*

CEO's risk-related incentives stem from the sensitivity of CEO's equity portfolio to stock price volatility and provide executives with incentives to take risks in the attempt of increasing the value of their option portfolio (Core et al., 2003). Coles et al. (2006) document that higher sensitivity of CEO wealth to stock volatility leads executives to implement riskier policy choices, including relatively more investment in R&D. As a consequence, we expect that CEOs incentivized on risk do not engage in real earnings management since this would encompass cutting discretionary expenditures that might boost future stock price volatility. Similarly, we anticipate that CEOs with high risk incentives do not use analysts' expectation guidance strategies but prefer to resort to accrual-based earnings management that does not have a potential negative effect on firm's stock volatility. This would also be consistent with findings in Grant et al. (2009) showing that that CEOs risk-taking incentives are positively related to income smoothing. Since we do not have an a priori conjecture about the relative preference of risk incentivized CEOs between real earnings management and analysts' guidance, we posit the following research hypotheses:

H2a: *CEO's with high risk incentives prefer to engage in accrual-based earnings management rather than guide analysts' expectations*

H2b: *CEO's with high risk incentives prefer to engage in accrual-based earnings management rather than manage real operations*

In Fama (1980)'s model, career concerns induce efficient managerial behavior that can overcome moral hazard problems. The argument is further explored by Holmström (1999) that develops a model in which learning about a qualified measure of the manager's talent and ability occurs through the observation of the manager's output. The precision of information about manager's

ability typically increases as time goes on; thus the market puts more weight on the output observations during the early stage of the executive's career. In fact, at the beginning of executive's career the market has less information and the output observations are more important for inferring manager's "type". As a consequence, young executives have higher career concerns than their old colleague because they have stronger incentives to deliver positive outcomes to the market. Therefore, similarly to equity incentives, career concerns align CEOs and shareholders' interests and make executives more prone to put efforts for delivering positive observable outcomes to the market. As a consequence, the above discussed side effects of real earnings management are particularly costly for executives with high career concerns and we anticipate that they use this earnings game strategy the least possible. Similarly, we expect also accrual-based earnings management to be costly for CEOs with high career concerns, even if to a lower extent than real earnings management. On the contrary, we anticipate that managers with high career concerns prefer to use analysts' expectation guidance to meet/beat targets. Our arguments mirror those of the first hypothesis: since accrual and real earnings management impose potential costs and risks on firms, when it is more important for executives to preserve firm's future value they use these earnings game strategies to a lower extent and prefer to guide analysts' expectations. Therefore we posit the following research hypotheses:

H3a: *CEO's with high career concerns prefer to guide analysts' expectations rather than manage real operations*

H3b: *CEO's with high career concerns prefer to guide analysts' expectations rather than engage in accrual-based earnings management*

H3c: *CEO's with high career concerns prefer to engage in accrual-based earnings management rather than manage real operations*

For the sake of clarity, Figure 2.1 summarizes our hypotheses about the role of CEO's incentives in the trade-off among accrual-based earnings management, real earnings management and analysts' guidance.

	Earnings Management Strategies		
CEO Incentives	**Worst**		**Best**
Equity Incentives	*Real Earnings Management*	*Accrual Earnings Management*	*Analysts' Guidance*
Risk Incentives	*Real Earnings Management and Analysts' Guidance*		*Accrual Earnings Management*
Career Concerns	*Real Earnings Management*	*Accrual Earnings Management*	*Analysts' Guidance*

Figure 2.1 *Research Hypotheses*

2.4 Variable Measurement

Accrual-based earnings management

We use a cross-sectional model to calculate discretionary accruals where, for each year and quarter, we estimate the normal accrual model for every industry using the Modified Jones Model. This approach, commonly used in earnings management literature (e.g. Cohen and Zarowin, 2010), partially controls for industry-wide changes in economic conditions that affect total accruals, while allowing the coefficients to vary across time. Specifically, we start estimating the following cross-sectional model for each 2 digit SIC/year/quarter group:

$$\frac{TA_{i,t,q}}{Assets_{i,t,q-1}} = k_1 \frac{1}{Assets_{i,t,q-1}} + k_2 \frac{\Delta SALES_{i,t,q}}{Assets_{i,t,q-1}} + k_3 \frac{PPE_{i,t,q}}{Assets_{i,t,q-1}} + \varepsilon_{i,t,q} \quad (1)$$

In the above model, for fiscal year t, quarter q, and firm i, TA represents the total accruals computed as the difference between i) earnings before extraordinary items and discontinued operations and ii) operating cash flows from continuing operations. *Assets* represent firm's total assets, ΔSALES is the change in revenues from the preceding quarter, and PPE is the gross value of property, plant and equipment[2].

The coefficient estimates from (1) are then used to estimate the firm-specific normal accruals (NA) as follows:

$$NA_{i,t,q} = \hat{k}_1 \frac{1}{Assets_{i,t,q-1}} + \hat{k}_2 \frac{\Delta SALES_{i,t,q} - \Delta AR_{i,t,q}}{Assets_{i,t,q-1}} + \hat{k}_3 \frac{PPE_{i,t,q}}{Assets_{i,t,q-1}} \quad (2)$$

Where ΔAR is the change in accounts receivables from the preceding quarter. Finally, we compute discretionary accruals as the difference between firm's total accruals (scaled by total assets) and NA. Kothari et al. (2005) argue that traditional accrual earnings management measures tend to be mis-specified because performance and estimated metrics exhibit a mechanical relation. In order to overcome this problem, we follow their suggestion and compute a *performance-matched* discretionary accrual metric (*Accrual EM*). Specifically, for each treatment firm in our sample, we identify a control firm in the same 2-digit SIC code, year and quarter, with the smallest difference in terms of ROA. Then, we compute the accrual earnings management metric for the *treatment* firm as the difference in the earnings management proxy between the treatment and control firm.

[2] Following Matsumoto (2002), for firms that report a balance for PPE in the fourth fiscal quarter but report missing data in quarters 1-3, we compute the year-to-year change in PPE and add to each of the interim quarters a proportional amount of this change based on the proportion of annual depreciation incurred in that quarter.

Real earnings management

We build on previous literature to develop our proxies of real earnings management (Roychowdhury, 2006; Bartov and Cohen, 2009; Cohen et al., 2008; Cohen and Zarowin, 2010; Zang 2012). Following Zang (2012), we focus on i) reporting lower cost of goods sold through increased production and ii) decreasing discretionary expenditures[3].

We first generate the normal level of discretionary expenses and production costs using the models developed by Dechow et al. (1998) as implemented by Roychowdhury (2006). Specifically we use the following model to estimate the normal level of production costs:

$$\frac{PROD_{i,t,q}}{Assets_{i,t,q-1}} = k_1 \frac{1}{Assets_{i,t,q-1}} + k_2 \frac{SALES_{i,t,q}}{Assets_{i,t,q-1}} + k_3 \frac{\Delta SALES_{i,t,q}}{Assets_{i,t,q-1}} + k_4 \frac{\Delta SALES_{i,t,q-1}}{Assets_{i,t,q-1}} + \varepsilon_{i,t,q} \quad (3)$$

Where production costs (PROD) are defined as the sum of cost of goods sold and changes in inventory during the quarter. Abnormal production costs (R_PROD) are defined as actual production costs minus normal production costs computed using the estimated coefficients from (3).

Secondly, we model discretionary expenses as a function of lagged sales and estimate the following model to derive normal levels of discretionary expenses:

$$\frac{DISX_{i,t,q}}{Assets_{i,t,q-1}} = k_1 \frac{1}{Assets_{i,t,q-1}} + k_2 \frac{SALES_{i,t,q-1}}{Assets_{i,t,q-1}} + \varepsilon_{i,t,q} \quad (4)$$

[3] Following Zang (2012) we do not examine abnormal cash flows from operations because real activities manipulation impacts it in different directions, and the net effect is ambiguous (see also Roychowdhury 2006)

Where DISX are selling, general and administrative expenses from Compustat dataset[4]. Abnormal levels of discretionary expenditures (R_DISX) are then defined as actual discretionary expenses minus normal discretionary expenses computed using the estimated coefficients from (4). Also in this case we use a performance match approach for eliminating any bias due to the correlation among real earnings management metrics (R_PROD and R_DISX) and firm's performance.

Following Cohen and Zarowin (2010) and Zang (2012), in order to capture the total effect of real earnings management we combine the two individual measures into one comprehensive metric of real earnings management (*Real EM*). Specifically, we first multiply abnormal discretionary expenses by negative one (so that the higher amount, the more likely it is that the firm is cutting discretionary expenditures) and add it to abnormal production costs.

Analysts' expectation guidance

As proxy for analysts' guidance we use the model developed and validated by Matsumoto (2002) which adopts a method similar to the Jones model (Jones, 1991) for computing abnormal accruals. Specifically, we first estimate the expected portion of analysts' forecast by modeling the *seasonal* change in earnings as a function of i) the prior quarter's *seasonal* change in earnings and ii) returns cumulated over the current year:

$$\Delta EPS_{i,j,t,q}/P_{i,j,t,q-4} = \alpha_{j,t} + \beta_{1j,t}*(\Delta EPS_{i,j,t,q-1}/P_{i,j,t,q-5}) + \beta_{2j,t}*CRET_{i,j,t,q} + \varepsilon_{i,j,t,q} \quad (5)$$

[4] Since we are using quarterly data we follow Bartov and Cohen (2009) and focus on selling, general and administrative (SG&A) expenses that are available on a quarterly base. In Compustat, quarterly SG&A expenditures also include R&D investments.

where:

ΔEPS_{ijtq} is earnings per share for firm i in four-digit SIC code j in quarter q of year t, less earnings per share for the same firm four quarters prior (i.e. quarter t-4), as reported in I/B/E/S;

P_{ijtq} is price per share for firm i in four-digit SIC code j at the end of quarter q of year t, as reported in quarterly Compustat;

$CRET_{ijtq}$ is cumulative daily excess returns for firm i in four-digit SIC code j in quarter q of year t obtained from CRSP. Returns are cumulated from three days after the quarter q-4 earnings announcement to 20 days before the quarter q earnings announcement.

This model is estimated for each firm year using all firm-quarters in that year from the same four-digit SIC code. Since the estimate of analysts' expected forecast should use only data that would be available to analysts in making their forecast, following Matsumoto (2002) we use the parameter estimates from the prior firm-year to determine the expected change in EPS (E[ΔEPS]). We then add this value to the earnings from the same quarter in the prior year to obtain the expected forecast (E[F]) of the current quarter's earnings:

$$E[\Delta EPS_{i,j,t,q}] = [\ \hat{\alpha}_{j,t-1} + \hat{\beta}_{1j,t-1}*(\Delta EPS_{i,j,t,q-1}/P_{i,j,t,q-5}) + \hat{\beta}_{2j,t-1}*CRET_{i,j,t,q}]* P_{i,j,t,q-4} \quad (6)$$

$$E[F_{i,j,t,q}] = EPS_{i,j,t,q-4} + E[\Delta EPS_{i,j,t,q}] \quad (7)$$

Subtracting the expected forecast (computed using equation 7) from the last published consensus forecast for the quarter provides the unexpected portion of the forecast (UEF). We then multiply UEF by minus 1 (*Guidance EM*) so that the higher the amount, the more likely it is that the firm has downward guided analysts' forecasts.

The trade-off among earnings game strategies

Given our focus on the use of earnings game strategies, we test our research hypotheses in a setting in which earnings management is likely to occur. Specifically, we restrict our investigation to year-quarters in which the firm has exactly met analysts' consensus earnings forecasts, or has exceeded it by one cent (*suspect firms*)[5]. Since we analyze firms' trade-off decision among the three earnings management alternatives, and we do not investigate the choice of whether engaging in the earnings game, we create four metrics that directly analyze the trade-off among earnings game strategies. Specifically, using the final sample of suspect firms, we sort the three earnings management proxies above defined (*Accrual EM*, *Real EM*, and *Guidance EM*) into deciles and create the following ratios:

$$Real\_vs\_All = \frac{Decile\ Real\ EM}{(Decile\ Accrual\ EM + Decile\ Real\ EM + \ Decile\ Guidance\ EM)}$$

$$Real\_vs\_Accrual = \frac{Decile\ Real\ EM}{Decile\ Accrual\ EM}$$

$$Real\_vs\_Guidance = \frac{Decile\ Real\ EM}{Decile\ Guidance\ EM}$$

$$Accrual\_vs\_Guidance = \frac{Decile\ Accrual\ EM}{Decile\ Guidance\ EM}$$

CEO's equity incentives

As Core et al. (2003) emphasize, executive incentives from stocks and options are properly measured only considering *portfolio* incentives. In fact, the amount of newly granted restricted stocks and stock options is not sufficient for evaluating the amount of incentives the executive is provided with (Yermack, 1995). We measure CEO's equity incentives (*Equity Incentives*) using

[5] We focus on analysts' forecasts both because Brown and Caylor (2005) show that, in recent years, managers seek to avoid negative quarterly earnings surprises more than to avoid missing other targets, and because analysts' earnings forecast is the only target that can be reached using all the three earnings game strategies under investigation.

of the incentive ratio computed as in Bergstresser and Philippon (2006, 519-520). We start computing the dollar change in the value of executive's stock and option holdings that would come from a one percentage point increase in the company stock price (ONEPCT). In order to estimate the Delta of CEO's option portfolio we follow Core and Guay (2002)'s methodology. In particular, CEO's options are divided into three groups (options awarded during the year, options awarded in previous years but not yet exercisable and options granted in previous years and currently exercisable) and separate estimates of the delta are computed[6]. Core and Guay (2002) show that their proxy captures more than 99% of the variation in option portfolio value and sensitivity. Starting from 2006, Execucomp reports all the necessary data for directly computing the delta of CEO's option portfolio, thus eliminating the need of using Core and Guay (2002)'s approximation. Secondly, ONEPCT is standardized by the amount of cash compensation[7] received by the executive during the fiscal year as in Bergstresser and Philippon (2006).

CEO's risk incentives

We measure CEO risk-related incentives (*Risk Incentives*) in a methodology similar to that used by Rogers (2002, 2005) and Grant et al. (2009), namely the Vega of CEO's stock options divided by their Delta. This is consistent with Core et al. (2003), claiming that risk taking is a second-order effect in option compensation since the incentives to increase stock price dominates the incentive to take risk. We therefore examine the role on earnings game strategies of this second-order effect with respect to the first-order one. We compute CEO's option Vega as the sensitivity of CEO's option holding to a unit change in stock price volatility by using the first derivative of

[6] Appendix A reports the formula used for computing the sensitivity of individual stock options to changes in stock price.
[7] Cash compensation is defined as the sum of base salary and annual bonuses.

the Black-Scholes option-pricing model in relation to firm's volatility[8]. The Delta is instead computed taking the partial derivative of the Black-Scholes equation with respect to stock price. As described in the previous paragraph, when necessary we used Core and Guay (2002)'s methodology to retrieve the data for computing options' Vega and Delta.

CEO's career concerns

Consistently with our research framework, we proxy for CEO's career concerns using CEO's age as disclosed in Execucomp. Since old CEOs have lower career concerns than young executives, we create the variable *Career Concerns* that is equal to CEO's age multiplied by minus one. Thus, a positive coefficient on *Career Concerns* indicates that CEOs with high career concerns (young CEOs) engage more in a given earnings game strategy than executives with low career concerns (old CEOs).

Control variables

We include in our models several control variables that previous literature has shown to influence earnings game strategies (e.g. Zang, 2012).

Log Assets is the natural logarithm of total assets and proxies for firm's size; *Cycle* is the length of the operating cycle computed as in Dechow (1994) and it is an underlying determinant of the variability of working capital; *M_B* is the market value of equity divided by the book value of equity, and it proxies for growth opportunities; *Z Score* is Altman's Z-score (Altman, 2000) which proxies for a firm's financial health; *Market Share* is firm's market share computed as the ratio of a company's total sales to the total sales of its three-digit SIC code industry in a given year-quarter; *NOA* is firm's net operating assets (i.e. shareholders' equity less cash and

[8] See Appendix A

marketable securities plus total debt) standardized by total assets; *BIG 4* is an indicator variables that takes the value of 1 if firm's auditor is a Big 4, zero otherwise; *Tenure Auditor* is the number of years the auditor has audited the firm; *ROA* is operating profits divided by total assets; *Tenure CEO* is a dummy variable that takes on value of 1 if CEO's tenure is greater or equal to 3, and zero otherwise. This is consistent with Fredrickson et al. (1988) that argue that early vulnerability occurs when CEO tenure is less than, or equal to, three years, while after three years CEOs start gaining power and becoming more entrenched.

2.5 Empirical Analyses

Sample selection

We start with 348,998 firm-quarter observations from Compustat over the period 2003-2010. Following a common practice in earnings management literature (see Roychowdhury, 2006) we exclude firms in regulated industries (SIC codes between 4400 and 5000) and banks and financial institutions (SIC codes between 6000 and 6500), losing 73,176 firm-quarters. We subsequently delete 99,288 and 25,385 firm-quarters with missing data on Compustat for computing accrual and real earnings management metrics. Then, we merge Compustat database with I/B/E/S dataset and lose 98,537 firm-year quarters with no full data for computing analyst expectations' guidance. Finally, we merge Compustat and I/B/E/S datasets with Execucomp, deleting 24,749 firm quarters with no data on all CEO's incentives and further 871 firm-quarters with missing control variables. Restricting the sample to suspect firms leads a final sample of 4,471 firm-quarter observations generated from 1,088 unique firms. Table 2.1 provides a tabular representation of the sample selection process and describes the distribution of observations for fiscal quarter and year.

TABLE 2.1
Sample Selection and Composition

Panel A

Firm-quarter observation in Compustat (2003-2010)	348,998
minus	
SIC codes from 6000 to 6500 and from 4400 to 5000	73,176
Missing data for computing discretionary accruals	99,288
Missing data for computing real earnings management	25,385
Missing data for computing analysts' guidance	98,537
Missing data from Execucomp on the CEO	24,749
Missing data on other control variables	817
No suspect firms (|FE| <= 0.01)	22,575
Final Sample	**4,471**
Unique firms	**1,088**

Panel B

Quarter	Freq.	Percent	Cum.
1	1,129	25%	25%
2	1,151	26%	51%
3	1,062	24%	75%
4	1,129	25%	100%
Total	**4,471**	**100%**	

Panel C

Year	Freq.	%	% Cum.
2003	835	19%	19%
2004	686	15%	34%
2005	616	14%	48%
2006	428	10%	57%
2007	618	14%	71%
2008	494	11%	82%
2009	410	9%	91%
2010	384	9%	100%
Total	**4,471**	**100%**	

Descriptive statistics and correlations

Table 2.2 presents descriptive statistics of the main variables used in the analysis. Since deciles distributions are not informative, we report the row values of earnings management proxies

(*Accrual EM*, *Real EM, Guidance EM*). All values appear to be into reasonable ranges and are comparable with those of previous studies. Specifically, the median incentive ratio is 0.23 with substantial variability among CEOs, while options' second-order effect represents in median the 57% of the first-order effect. The median CEO is 55 years old and holds the position for more than three years. Firm characteristics show that our sample (as it is usual when dealing with Execucomp database) is made by large and profitable firms, with high growth opportunities.

TABLE 2.2
Descriptive Statistics

	N	Mean	SD	p25	p50	p75
CEO Incentives						
Equity Incentives	4,471	0.292	0.225	0.122	0.229	0.396
Risk Incentives	4,471	0.637	0.442	0.363	0.566	0.805
Career Concerns	4,471	-54.746	7.239	-60.000	-55.000	-50.000
	N	**Mean**	**SD**	**p25**	**p50**	**p75**
Numbers Game Strategies						
Accural EM	4,471	-0.007	0.059	-0.035	-0.004	0.024
Real EM	4,471	-0.005	0.079	-0.046	-0.004	0.037
Guidance EM	4,471	-0.007	0.144	-0.079	-0.006	0.065
	N	**Mean**	**SD**	**p25**	**p50**	**p75**
Controls						
Log Assets	4,471	7.115	1.440	6.082	6.956	8.010
Cycle	4,471	119.590	72.338	67.682	105.858	154.384
M_B	4,471	3.373	2.954	1.735	2.645	4.055
Z Score	4,471	4.875	5.293	1.895	3.292	5.887
Market Share	4,471	0.064	0.112	0.002	0.016	0.073
NOA	4,471	0.809	0.183	0.717	0.870	0.957
Big 4	4,471	0.931	0.254	1.000	1.000	1.000
Tenure Auditor	4,471	12.427	9.013	6.000	10.000	17.000
ROA	4,471	0.015	0.021	0.007	0.015	0.025
Tenure CEO	4,471	0.642	0.480	0.000	1.000	1.000

Variable definition in Appendix 2.B.

Table 2.3 presents Pearson correlation coefficients among the main variables included in the analysis.

TABLE 2.3
Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Equity Incentives	1														
2	Risk Incentives	-0.281***	1													
3	Career Concerns	-0.063***	0.046**	1												
4	Accural EM	-0.030*	0.005	-0.036*	1											
5	Real EM	-0.076***	-0.001	-0.067***	0.119***	1										
6	Guidance EM	0.083***	-0.090***	0.022	-0.001	-0.034*	1									
7	Log Assets	0.156***	0.228***	-0.096***	-0.029	0.056***	-0.009	1								
8	Cycle	-0.043**	0.058***	-0.069***	-0.028	-0.131***	0.060***	-0.022	1							
9	M_B	0.281***	-0.101***	0.007	-0.021	-0.097***	0.063***	0.067***	-0.062***	1						
10	Z Score	0.303***	-0.216***	0.034*	-0.071***	-0.076***	0.096***	-0.251***	0.110***	0.271***	1					
11	Market Share	0.041**	0.088***	-0.100***	0.025	0.101***	-0.087***	0.437***	-0.145***	0.087***	-0.159***	1				
12	NOA	-0.170***	0.143***	-0.164***	0.099***	0.154***	-0.084***	0.312***	-0.038*	-0.119***	-0.460***	0.260***	1			
13	Big 4	-0.006	0.069***	-0.014	-0.039**	-0.003	-0.002	0.279***	-0.023	0.003	-0.082***	0.079***	0.066***	1		
14	Tenure Auditor	-0.031*	0.160***	-0.096***	0.017	0.022	0.003	0.278***	0.049**	-0.045**	-0.102***	0.139***	0.128***	0.155***	1	
15	ROA	0.213***	-0.164***	-0.043**	0.010	-0.043**	-0.020	0.069***	-0.051***	0.340***	0.394***	0.119***	-0.007	-0.022	0.025	1
16	Tenure CEO	0.286***	-0.149***	-0.221***	0.005	0.020	0.026	-0.080***	0.025	-0.009	0.075***	-0.060***	-0.010	-0.039**	-0.054***	0.069***

The Table reports Pearson correlation coefficients. Variable definition in Appendix 2.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively. P-values are two tailed.

As expected there is a negative correlation between CEO's equity and risk incentives since the measure of risk incentives adjusts, at the denominator, for the sensitivity of CEO's option portfolio to changes in stock price. CEO's career concerns are negatively associated with CEO's equity incentives since young executives have smaller equity portfolios than their old colleagues. Finally, since executives holding the CEO position for a long time have more firm's stocks and options in their portfolios than new executives, there is a positive correlation between CEO's equity incentives and CEO's tenure.

Univariate Analysis

Jointly considered, our research hypotheses conjecture that real earnings management is the most costly earnings game strategy for CEOs with high equity incentives, risk incentives and career concerns, and thus highly incentivized executives prefer to substitute it with other alternatives (see Figure 2.1). Table 2.4 classifies observations into quintiles according to the level of CEO's incentives and tabulates, for each group, the mean level of the variable *Real_vs_All*. Consistently with H1 and H3, univariate results show that the higher the CEO's equity incentives (Panel A) and career concerns (Panel C), the lower the amount of real earnings management used by the company with respect to the overall earnings management activity undertaken. On the contrary, results from Table 2.4, Panel B, do not provide evidence that CEOs with high risk incentives engage less in real earnings management with respect to CEOs with low risk incentives. In the following we test our hypotheses in a multivariate setting and consider the presence of endogeneity between CEO's compensation structure and earnings game strategies.

TABLE 2.4
CEO's Incentives and Earnings Game: Univariate Analysis

Panel A	**Real_vs_All**	
Equity Incentives Quintile	*Median*	
Lowest	0.347	
2nd quintile	0.335	
3rd quintile	0.335	
4th quintile	0.335	
Highest	0.306	
H_0: Lowest - Highest = 0	**z = 5.819**	**p-value = 0.000**

Panel B	**Real_vs_All**	
Risk Incentives Quintile	*Median*	
Lowest	0.318	
2nd quintile	0.332	
3rd quintile	0.332	
4th quintile	0.339	
Highest	0.336	
H_0: Lowest - Highest = 0	**z = -2.424**	**p-value = 0.015**

Panel C	**Real_vs_All**	
Career Concerns Quintile	*Median*	
Lowest	0.337	
2nd quintile	0.343	
3rd quintile	0.333	
4th quintile	0.329	
Highest	0.313	
H_0: Lowest - Highest = 0	**z = 3.459**	**p-value = 0.000**

The table reports the mean value of the variable Real_vs_All according to the quintile of the distribution of CEO's equity incentives (Panel A), CEO's risk incentives (Panel B), and CEO's career concerns (Panel C).
Variable definition in Appendix 2.B. P-values are two tailed.

Multivariate Analysis

In our research setting, endogeneity is likely to be an issue because compensation structure and reporting strategies are jointly determined by the firm. We assume that earnings game strategies can be presented in the following form:

Earnings management strategies = f(equity incentives, risk incentives, career concerns, control variables) (A)

To control for the endogeneity of equity and risk incentives, our research design uses a system of simultaneous equations by adding the following to (A):

Equity incentives = f(industry equity incentives, control variables) (B)

Risk incentives = f(industry risk incentives, control variables) (C)

In this system of simultaneous equations, equation (A) measures the trade-off among earnings game strategies given the CEO's incentives. These, in turn, are specified in (B) and (C) using as instrument for CEO's equity (risk) incentives of firm i in year t, the mean of the equity (risk) incentives provided, in year t, to all CEOs of firms belonging to firm *i*'s 2-digits sic code[9]. The underlying motivation of using these two instruments is that compensation structures tend to be correlated inside given industries (Murphy, 1999) but, arguably, the *industry* compensation structure is not related to the reporting strategy of a specific firm. We estimate equations (A), (B), and (C) through three-stage least square (3SLS). Table 2.5 reports results using *Real_vs_All* as dependent variable in equation (A). The negative and statistically significant coefficients on CEO's equity incentives and career concerns corroborate results from the univariate analysis and, consistently with our research hypotheses, suggest that CEOs with high equity incentives and career concerns tend to substitute real earnings management with other alternatives. It is important to note that, consistently with our research framework, the variable *Real_vs_All* does not capture the total amount of earnings management but it proxies for the relative use of real earnings management with respect to overall earnings management activity.

[9] We excluded firm i from the computation.

TABLE 2.5
CEO's Incentives and Earnings Game: Multivariate Analysis

Dependent variable:	**Real_vs_All**	**Equity Incentives**	**Risk Incentives**
		3SLS	
	Eq. A	*Eq. B*	*Eq. C*
Equity Incentives	**-1.145*** **		
	[-4.746]		
Risk Incentives	**-0.046**		
	[-0.366]		
Career Concerns	**-0.002*** **	-0.001	0.003***
	[-3.753]	[-1.612]	[3.832]
Log Assets	0.059***	0.046***	0.046***
	[5.331]	[19.117]	[9.655]
Cycle	-0.000***	-0.000***	0.000***
	[-6.173]	[-3.830]	[3.520]
M_B	0.009***	0.012***	-0.004*
	[2.614]	[11.517]	[-1.679]
Z Score	0.011***	0.010***	-0.007***
	[3.939]	[14.543]	[-4.701]
Market Share	0.123***	0.009	-0.024
	[3.968]	[0.316]	[-0.408]
NOA	-0.043	-0.136***	0.076**
	[-1.046]	[-7.355]	[2.068]
Big 4	-0.042**	-0.035***	0.041*
	[-2.546]	[-3.000]	[1.775]
Tenure Auditor	-0.001*	-0.001***	0.003***
	[-1.958]	[-3.041]	[4.806]
ROA	-0.075	0.191	-2.363***
	[-0.219]	[1.182]	[-7.363]
Tenure CEO	0.149***	0.133***	-0.094***
	[4.045]	[21.788]	[-7.756]
Equity Incentives Industry		0.661***	
		[12.324]	
Risk Incentives Industry			0.655***
			[31.795]
Year Dummies	YES	NO	NO
Quarter Dummies	YES	NO	NO
Industry Dummies	YES	NO	NO
Observations	4,471	4,471	4,471

The table reports 3SLS estimate results for equations A, B, and C. Variable definition in Appendix 2.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively. P-values are two tailed. z-statistics in brackets.

The insignificant coefficient on CEO's risk incentives confirms results from the univariate analysis and indicates that CEO's risk incentives do not make executives less likely to resort to real earnings management.

In order to directly investigate the order of preference hypothesized among the three earnings game strategies, we estimate equations A, B, and C using as dependent variable in equation A the proxies *Real_vs_Guidance, Accrual_vs_Guidance*, and *Real_vs_Accrual.* In fact, these variables compare earnings game strategies two by two, and allow us to shed lights on their trade-off. Specifically, given our research hypotheses, we expect the following coefficients on CEO's incentive metrics in equation A:

	Earnings Management Metrics		
CEO Incentives	**Real_vs_Guidance**	**Accrual_vs_Guidance**	**Real_vs_Accrual**
Equity Incentives	**—**	**—**	**—**
Risk Incentives	**?**	**+**	**—**
Career Concerns	**—**	**—**	**—**

Figure 2.2. *The trade-off among earnings game strategies*

Three-stage least-square estimates for equation A are reported in Table 2.6. For the sake of brevity we do not report results from equations B and C, which are similar to those presented in Table 2.5. Consistently with H1a, H1b and H1c, coefficients on CEO's equity incentives are negative and statistically significant across the three earnings management metrics analyzed.

TABLE 2.6
Disentangling the Effects of CEO's Incentives on Earnings Game Strategies

Dependent variable:	**Real_vs_Guidance**	**Accrual_vs_Guidance**	**Real_vs_Accrual**
	(1)	**(2)**	**(3)**
		3SLS	
Equity Incentives	**-13.794*** **	**-11.112*** **	**-20.271*** **
	[-4.494]	**[-3.743]**	**[-7.238]**
Risk Incentives	**-1.700**	**3.225** **	**-1.070**
	[-1.065]	**[2.081]**	**[-0.734]**
Career Concerns	**-0.020*** **	**-0.028*** **	**-0.023*** **
	[-2.586]	**[-3.756]**	**[-3.177]**
Log Assets	0.738***	0.351***	1.029***
	[5.197]	[2.586]	[7.883]
Cycle	-0.003***	-0.002**	-0.005***
	[-3.515]	[-2.449]	[-5.324]
M_B	0.122***	0.143***	0.237***
	[2.760]	[3.347]	[5.875]
Z Score	0.122***	0.114***	0.213***
	[3.324]	[3.188]	[6.350]
Market Share	2.183***	0.845**	0.737**
	[5.470]	[2.210]	[1.960]
NOA	-0.541	-1.056**	-2.328***
	[-1.046]	[-2.100]	[-4.905]
Big 4	-0.307	-0.527***	-0.647***
	[-1.457]	[-2.592]	[-3.321]
Tenure Auditor	-0.009	-0.015**	-0.019***
	[-1.193]	[-2.137]	[-2.894]
ROA	-0.094	14.227***	-5.565
	[-0.021]	[3.352]	[-1.384]
Tenure CEO	1.715***	1.674***	2.622***
	[3.653]	[3.668]	[6.134]
Year Dummies	YES	YES	YES
Quarter Dummies	YES	YES	YES
Industry Dummies	YES	YES	YES
Observations	4,471	4,471	4,471

The table reports 3SLS estimate results for equations A simultaneously estimated with equations B and C (untabulated). Variable definition in Appendix 2.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively. P-values are two tailed. z-statistics in brackets.

Specifically, results indicate that CEOs with high equity incentives prefer to guide analysts' expectations (column 1) or engage in accrual-based earnings management (column 3) rather than manipulating firm's business operations, thus supporting H1a and H1c. The negative coefficient on CEO's equity incentives in column 2 also confirms H1b, and indicates that CEOs with high equity incentives prefer to guide analysts rather than managing accruals.

Consistently with the univariate analysis, Table 2.6 only provides partial support for H2. Specifically, the positive and significant coefficient on CEO's risk incentives in column 2 confirms that CEOs with high risk-incentives prefer to manage accruals instead of guiding analysts' expectations (H2a), while the statistically insignificant coefficient in column 3 does not support the conjecture that risk-incentives, stemming from stock option holding, prevent CEOs from managing real operations (H2b). This result can be due to the fact that risk-related incentives might only prevent cutting certain types of discretionary investments (e.g. long-term R&D) while they do not have any effects on cutting other expenditures (e.g. employee training) that determine real earnings management metrics.

As expected, coefficients on CEO's career concerns mirror those of CEO's equity incentives and support H3a, H3b, and H3c. Specifically, results suggest that CEOs with high career concerns prefer i) to guide analysts as first choice, ii) to manage accruals as second option, and iii) to manipulate real activities as last available alternative.

Additional Analyses

The previous analyses suggest that CEOs with high equity incentives and high career concerns consider real earnings management the most costly earning game strategy and try to avoid it. Our research framework assumes that this result is due to the fact that real earnings management, contrary to accrual-based earnings management and analysts' expectation guidance, modifies

firm's operations and thus decreases firm's future shareholder value. Executives whose interests are more aligned with those of shareholders, in terms of equity incentives and career concerns, incorporate this cost to a larger extent than CEOs with low incentives, and use less real manipulations to meet/beat benchmarks.

In this section of the paper we empirically test this underlying assumption, by analyzing if firms engaging in real manipulations have lower future performances with respect to companies that adopt other earnings game strategies. Specifically, we analyze the economic consequences of using real earnings management rather than accrual earnings management or analysts' guidance by focusing on future market performance, which is a direct measure of shareholder value.

In our empirical analysis we consider the presence of potential engogeneity both between CEO's compensation and earnings game strategies, as well as between earnings game strategies and firm's market performance. In fact, executives are likely to decide current earnings game strategies considering firm's future performance prospects, thus raising potential endogeneity problems. Specifically, we model firm's future market performance as follows:

Future market performance = f(earnings management strategies, control variables) (D)

and to control for endogeneity we add the following equations to (D):

Earnings management strategies = f(equity incentives, risk incentives, career concerns, control variables) (A)

Equity incentives = f(industry equity incentives, control variables) (B)

Risk incentives = f(industry risk incentives, control variables) (C)

Table 2.7 reports results for equation (D) obtained by estimating the simultaneous equation system made by equations (D), (A), (B) and (C) through 3SLS. In order to investigate the effect

of using real earnings management rather than accrual-based earnings management or analysts' expectation guidance, we use as independent variable in (D) the variable *Real_vs_All*. Instead, for analyzing the persistence of effects documented we use as dependent variable in (D) firm's market returns cumulated one quarter ahead (*Returns Q+1*), two quarters ahead (*Returns Q+2*), three quarters ahead (*Returns Q+3*), and four quarters ahead (*Returns Q+4*)[10].

TABLE 2.7
EG Strategies and Future Market Performance

Dependent variable:	**Returns (Q+1)**	**Returns (Q+2)**	**Returns (Q+3)**	**Returns (Q+4)**
	(1)	**(2)**	**(3)**	**(4)**
	3SLS			
Real_vs_All	**-0.351*** **	**-0.561*** **	**-0.543*** **	**-0.380*** **
	[-4.593]	**[-5.116]**	**[-4.148]**	**[-2.606]**
Log Assets	-0.007***	-0.012***	-0.018***	-0.024***
	[-3.512]	[-4.117]	[-4.994]	[-5.962]
M_B	-0.005***	-0.008***	-0.010***	-0.010***
	[-4.615]	[-4.677]	[-4.636]	[-4.275]
Z Score	-0.003***	-0.004***	-0.006***	-0.007***
	[-4.070]	[-3.359]	[-4.135]	[-4.412]
Cash Flow	0.110**	0.162**	0.205***	0.224**
	[2.438]	[2.519]	[2.607]	[2.531]
Growth	-0.006	-0.030	-0.013	-0.038
	[-0.298]	[-1.003]	[-0.355]	[-0.905]
Leverage	0.010	0.018	0.012	-0.008
	[0.487]	[0.581]	[0.319]	[-0.188]
Observations	4,377	4,376	4,358	4,328

The table reports 3SLS estimate results for equations D simultaneously estimated with equations A, B and C (untabulated). Returns (Q+x) is firm's cumulated market returns x quarters ahead.
Variable definition in Appendix 2.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively. P-values are two tailed. z-statistics in brackets.

[10] Note that market returns at Q+2 also include market returns at Q+1, as well as, market returns at Q+3 also include market returns at Q+1 and Q + 2, and so on.

The negative and statistically significant coefficients on *Real_vs_All*, throughout Table 2.7, provide support for our conjecture that real manipulation is the most costly earnings game strategy for shareholders, since it is systematically negatively associated with future market performance. This is consistent with findings reported in Graham et al. (2005), showing that when executives engage in real activity manipulations they are willing to take economic actions that could have negative long-term consequences and that sacrifice long-term value. Interestingly, the magnitude of the coefficients on *Real_vs_All* indicates that the negative impact of real manipulations follow a parabolic pattern, thus suggesting that the effects of real manipulations are persistent overtime but they are particularly strong after one quarter[11].

Results presented, therefore, suggest that equity and career incentives are effective in aligning CEOs' behavior and shareholders' interests, since they prevent CEOs from managing firm's operations with the subsequent documented negative effects on shareholder value.

2.6 ROBUSTNESS CHECKS

Performance matched earnings management measures

Since Kothari et al. (2005) and Cohen et al. (2011) argued that traditional accrual and real earnings management measures tend to be mis-specified we used a performance matched approach in the main analyses. Nonetheless, for testing the robustness of our results to alternative earnings management proxies we conduct our analyses using the raw earnings management metrics (i.e. without performance match) and results are qualitatively similar to those reported.

[11] Results are robust to including industry/year/quarter fixed effects also in D, as well as using abnormal market returns as dependent variables.

Suspect firms

Since our research framework assumes that firms engage in the earnings game in order to meet/beat earnings targets, we conducted our investigation focusing on suspect firms, as commonly defined in the literature. Nonetheless, this conservative approach reduces our final sample. Thus, we tried to repeat the analysis using the full sample of observations and results are qualitatively similar to those reported.

Endogeneity between CEO's incentives and future market performance

In equation (D) we do not include CEO's incentives among the independent variables. Since 3SLS estimates might be particularly sensitive to the inclusions/exclusion of regressors which are modeled as endogenous in the system, we estimate equations A, B, C, and D including in D also CEO's equity incentives, risk incentives and career concerns. Untabulated results show that the coefficient on the variable *Real_vs_All* continues to be negative and statistically significant across all model specifications.

2.7 CONCLUSIONS

Literature has shown that the market rewards firms meeting or beating earnings expectations (Degeorge et al., 1999; Brown and Caylor, 2005). Companies that are not able to meet earnings targets in the normal course of their operations may engage in the "earnings game" making choices among three non exclusive strategies: i) accrual-based earnings management, 2) real activity manipulation, and 3) analysts' expectation guidance. These strategies are not equivalent in terms of costs imposed on the firm because real earnings management, contrary to accrual-based earnings management and analysts' expectation guidance, makes firm's real operations to deviate from their normal course without an underlying economic reason and therefore it might

impair firm's future performance. Previous literature showed that both the introduction of the SOX in 2002, and firm-related characteristics, influence the relative costliness of the different earnings game strategies available to managers to meet/beat targets.

Using a sample of quarterly observations from U.S. firms over the period 2003-2010, we show that institutional environment and firm's characteristics are not the only determinants of the trade-off among earnings game strategies. In fact, we find evidence that CEOs trade off the different strategies also according to their personal benefits and costs. Specifically, we document that CEOs with high equity incentives and high career concerns are more likely to substitute real activity manipulations with other earnings management strategies, with respect to executives with low incentives. We also analyze the economic impact of the different earnings game strategies and find that when firms use real earnings management rather than accrual-based earnings management or analysts' guidance, they experience lower future market performance. Results, therefore, confirm our conjecture that this earnings game strategy imposes particularly high costs on firms. Equity incentives, as well as, career concerns are thus effective in aligning CEOs and shareholders' interests since they prevent executives from manipulating real operations with subsequent negative effects on shareholder value.

APPENDIX 2. A

Estimates of a stock option's sensitivity to stock price are calculated based on the Black-Scholes (1973) formula for valuing European call options, as modified to account for dividend payout by Merton (1973).

$$\textit{Option value} = [S\, e^{-dT} N(Z) - X e^{-rT} N(Z - \sigma\, T^{(1/2)})]$$

Where

$Z = [\ln(S/X) + T\,(r - d + \sigma^2/2]/\sigma T^{(1/2)}$

N = cumulative probability function for the normal distribution

S = price of the underlying stock

X = exercise price of the option

σ = expected stock-return volatility over the life of the option

r = risk-free interest rate

d = expected dividend yield over the life of the option

The sensitivity with respect to a 1% change in stock price is defined as:

$$[\delta(option\ value)/\delta(price)] * (price/100) = e^{-dT} * N(Z) * (price/100)$$

The sensitivity with respect to a 0.01 change in stock price volatility is defined as:

$$[\delta(option\ value)/\delta(volatility)] * 0.01 = e^{-dT} * N'(Z) * S T^{1/2} * 0.01$$

where N' is the normal density function.

APPENDIX 2. B

Variable	Definition
Equity Incentives	Dollar change in the value of CEO's stock and option holdings that would come from a one percentage point increase in the company stock price, standardized by cash compensation
Risk Incentives	Vega of CEO's stock options divided by their Delta
Career Concerns	CEO's age multiplied by minus 1
Accrual EM	Performance-matched signed discretional accruals computed using the Modified Jones Model
Real EM	Performance-matched abnormal production costs plus performance-matched abnormal discretionary expenses (multiplied by negative one), both of them computed as in Roychowdhury (2006)
Guidance EM	Unexpected portion of analysts' forecast computed as in Matsumoto (2002) multiplied by negative one
Real_vs_All	[Decile *Real EM*/(Decile *Accrual EM* + Decile *Real EM* + Decile *Guidance EM*)]
Real_vs_Guidance	(Decile *Real EM*/ Decile *Guidance EM*)
Accrual_vs_Guidance	(Decile *Accrual EM* /Decile *Guidance EM*)
Real_vs_Accrual	(Decile *Real EM*/ Decile *Accrual EM*)
Log Assets	Natural logarithm of total assets
Cycle	Length of the operating cycle computed as in Dechow (1994)
M_B	Market value of equity divided by the book value of equity
Z Score	Altman (2000)'s Z-score
Market Share	Firm's market share computed as the ratio of a company's total sales to the total sales of its three-digit SIC code industry in a given year-quarter
NOA	Firm's net operating assets (i.e. shareholders' equity less cash and marketable securities plus total debt) standardized by total assets
BIG 4	Indicator variables that takes the value of 1 if firm's auditor is a Big 4, zero otherwise
Tenure Auditor	Number of years the auditor has audited the firm
ROA	Operating profits divided by total assets
Tenure CEO	Dummy variable that takes on value of 1 if CEO's tenure is greater or equal to 3 and zero otherwise.

Chapter 3

Privatized Returns and Socialized Risks: CEO Incentives, Securitization Accounting and the Financial Crisis

with Antonio Parbonetti

3.1 Introduction

From 2000 to 2006 the amount of loans securitized almost doubled while the securitization of risky subprime mortgages grew by almost eight times, exceeding 800 billion US dollars at the end of 2006. Whether highly incentivized CEOs foresaw in securitizations under US GAAP an opportunity for hiding risks while bearing them, and generating profits and cash flows because of the risks, is an open issue that this paper is going to explore.

Securitizations transform illiquid assets into liquid securities and transactions that qualify for *sale accounting* offer several benefits that make them particularly appealing to originators. First, securitization enables financial institutions to optimally choose their exposure to the credit risk of loans generated (Jiangli and Pritsker, 2008). Second, securitization enables banks to replace illiquid loans with cash, improving banks' liquidity. Third, financial institutions subject to regulatory capital requirements trough securitizations increase regulatory capital ratios and free up regulatory capital. Fourth, securitization allows banks to increase their profitability through "gains on sale".

However, financial intermediation theories point out severe concerns over the effects of such transactions. A single lender has strong incentives to monitor stemming from holding illiquid loans on its balance sheet, while separating loans' originator and the bearer of loans' default risk might induce lax screening (Diamond, 1984). Consistently, the recent financial crisis has shown a large rate of delinquencies among the heavily securitized non-agency mortgages. Additionally, securitization generates frictions (Ashcraft and Schuermann, 2008). The transferor of loans has superior information with respect to the transferee and this creates moral hazard and adverse selection problems. Rajan (2006, p. 500) adds to those concerns the idea that the changes in the financial sector have altered managerial incentives, which in turn have altered the nature of risks undertaken by the system, with potential distortions.

Understanding the determinants of risk taking behaviors in the banking industry, and the role of equity and risk taking incentives, is of prominent importance because several factors that are unique to this setting affect risk-taking strategies.

First, financial institution being highly levered have incentives to engage in excess risk-taking, as shown by Jensen and Meckling (1976). Second, financial institutions raise debts through depositors or the direct access to Central Banks and, as a consequence, the increase in the level of risk does not necessarily translate into an increase in the cost of debt. Typically, depositors are small uninformed investors with deposits insured by the government as thus they lack the incentives and the abilities to monitor bank investments' decision and risk profile. Third, because the failure of one bank may generate a contagion effect, governments provide both explicit and implicit guarantees. As a consequence, the debt markets do not adjust the terms of their credit to account for the change in the bank risk profile. Consistent with this view, Haldane (2011) documents that in the pre-crisis period the credit default swap markets did not distinguish strong from weak banks.

Therefore, given the absence of debt markets constrain in the level of risk, risk incentives stemming from stock and option compensation might have a free reign in banks. This problem is further exacerbated if accounting regimes reduce the efficacy of capital adequacy requirements aimed at limiting risk taking behaviors.

To address our research questions we collect data from 10-K filings on the percentage of loans securitized and the amount of losses recorded on these loans for a sample of US financial institutions for the period 2003-2009. Moreover, we retrieve data on the financial institutions most involved in the securitization of *subprime* loans from a proprietary database that collects information on issuer of subprime securitizations in the US. We conduct our analysis in four steps, each of which speaking to the role of CEO's equity and risk incentives in boosting securitizations and in motivating executives to transfers risks to outside investors. In our research design we control for CEO's incentives being potentially endogenous with respect to securitization using a two-stage least-squares (2SLS) approach.

In the first set of analyses, we investigate the association between CEO's equity and risk incentives and total securitization. We document that CEOs with high levels of equity incentives engaged more in securitizations than executives with low equity incentives. This finding suggests that CEOs foresaw in securitizations under US GAAP an opportunity to boost stock price by generating cash flow, enhancing profits and/or freeing up regulatory capital. In the second set of analyses, we shift our focus from banks' decision to engage in securitizations to the quality of the assets transferred and the choice of opportunistically transferring off balance the risks generated. We document that CEOs with high equity *and* risk incentives engaged to a larger extent in the securitization of *risky* loans than low incentivized executives, and they transferred risk to outside investors by moving off-balance the riskiest loans. These results are consistent with the fact that securitization allowed CEOs to engage in risky lending activities and subsequently hiding the

risks generated from the books, thus offering the opportunity to reduce the perceived risk while betting on it. Third, in order to provide further insights on the opportunistic behavior of CEOs when transferring risks off-balance, we investigate the relation between CEO's incentives and the level of disclosure linked to securitization transactions. We find that CEO's risk incentives are negatively related to the quality of securitization disclosure. This result suggests that CEOs incentivized on risk were less prone to provide information on the quality of loans transferred off-balance. This finding further corroborates the idea that risk incentives have motivated CEOs to opportunistically take advantage from information asymmetry generated by securitization transactions. Fourth, we document that before the collapse of the subprime mortgage market in 2007, financial institutions involved in the securitization of subprime loans largely over performed other banks in terms of stock returns and accounting earnings. On the contrary, starting from 2007, subprime securitizers recorded worse performances than other financial institutions that were not involved in subprime securitization. Moreover, subprime securitizers were able to distribute more dividends than the peers. This is consistent with the fact that by securitizing risky loans banks were successful in boosting stock prices, increasing earnings and allowing dividend distribution, but the risks undertaken turned out to be extremely costly.

This paper contributes to several research streams. First, we contribute to the debate about compensation and risk taking in financial institutions showing that highly incentivized CEOs have used securitization to hide risks while betting on them. At the best of our knowledge this is the first paper that provide evidence that compensating CEOs of financial institutions as CEOs of industrial companies might be detrimental, supporting John et al. (2000, p. 97) analytical model which purports for "a prominent role for managerial compensation in bank regulation". Second, we add to the emerging research strand investigating the role of CEO's compensation in the financial crisis. Fahlenbrach and Stulz (2011) provide evidence that banks where CEOs had high

equity incentives performed significantly worse during the crisis than banks where CEOs had low incentives. We complement this result as we show that CEOs with high equity incentives systematically engaged in securitization transactions to a larger extent than CEOs with low levels of equity compensation and that they also securitized risky loans such as subprime mortgages. Third, we add to the growing research stream analyzing the determinants and effects of securitization transactions (Chen et al. 2008; Landsman et al. 2008; Dechow and Shakespeare 2009; Dechow et al. 2010; Amiram et al. 2011; Cheng et al. 2011; Barth et al. 2012). We contribute to this debate by focusing the analysis on the financial industry and documenting the relationship existing between CEO's equity compensation and securitization transactions. We therefore bring into the research framework direct evidence about one of the fundamental causes underlying securitization transactions that have been overlooked by previous literature. Fourth, at the best of our knowledge this paper is the first to formally investigate the level of disclosure linked to securitization transactions as a proxy for CEO's opportunistic behaviors.

Concluding, our results answer to the increasing demand for evidence on the role of CEO's incentives on the financial crisis that led economists to claims that "we're all paying now because skewed financial incentives led to too many big bets" (Solomon and Paletta, 2009).

3.2 Background

Asset securitization consists in converting illiquid assets, usually small loans that could not be separately sold, into liquid securities (ABSs) that are sold to investors in the financial market. By dividing, repackaging and distributing risks within the financial system securitizations transform risks into an "easily tradable commodity" (Haldane 2008, p. 32) triggering a shift from the traditional "originating and holding" banking business model to the "originating and selling" model.

The securitization process, illustrated in Figure 3.1, substitutes the close relationship between borrower and lender with a long chain which starts when the originator, typically a commercial bank or another financial institution, generates loans. The originator transfers the loans to a special purpose entity (SPE) becoming a sponsor of the SPE. The role of the SPE is to manage the loan pool and issue ABSs that give investors the right to receive the cash flows originated from the underlying loans. When the SPE issues ABSs, it divides them into different tranches (senior, mezzanine and junior) which have different returns and levels of risk, as reflected by ratings received by rating agencies. Finally, the amounts paid by the investors for the ABSs are transferred to the originator/sponsor which replaces the illiquid loans previously held in the balance sheet with cash.

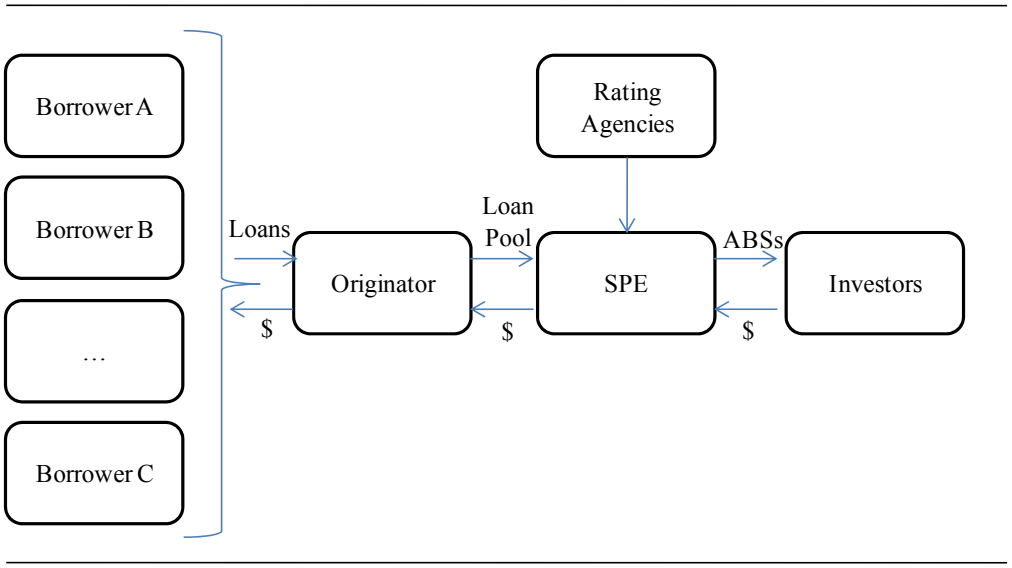

Figure 3.1 The securitization process

This long chain, linking borrowers with investors, is a mix of on balance and off-balance sheet conduits that generate, at every additional link in the chain, an increase in the scope of information gaps (Chen et al., 2008). These information asymmetries combined with the

favorable accounting treatment prescribed by SFAS 140 offered the opportunity to hide the risks generated and to bet on them.

Under SFAS 140, almost all securitizations were accounted for as a sale with the consequence that loans were derecognized from the balance sheet of the originator. Two are the most critical issues about the accounting for securitization: a) derecognition; and b) consolidation. SFAS 140 using a "financial component approach"[1] allows to decompose assets into a variety of components whose accounting treatment depends on whether the transferor has surrendered control or not. Moreover, to eliminate definitively assets from balance sheet, the transferor has also to avoid the consolidation of SPEs (special purpose entities). Under SFAS 140 a QSPE (qualified special purpose entity) was "automatically" excluded from consolidation and the accounting standard required that a qualifying SPE has to be demonstrably distinct from the transferor and significantly limited in its activities. Understanding whether a SPE is a QSPE required judgment and involved discretionality typically used to avoid the consolidation of the vehicle.

A central point surrounding securitizations is that these transactions might have reduced the incentives of financial intermediaries to carefully screen borrowers. For a lender to screen and monitor it must be given appropriate incentives and this can be provided by the illiquid loans on its balance sheet (Holmström and Tirole 1997; Diamond and Rajan 2009). When, thanks to securitization, banks replace illiquid loans with cash they might lose the appropriate level of incentives to properly monitor the quality of loans granted. In this line, Keys et al. (2010) investigate the relationship between securitization and screening standards in the context of subprime mortgage loans and find that existing securitization practices did adversely affect the screening incentives of subprime lenders.

[1] SFAS 140, issued in 2000, introduced the financial component approach for the asset derecognition problem.

By eliminating loans from the balance sheet, securitization transactions also provide the originator with the benefit of reducing risk based capital (Jones, 2000; Acharya and Richardson, 2009). The critical point is that even when the bank's originator buys back the most junior tranches of ABSs, loans are eliminated from banks' balance sheet. Nonetheless, because of this explicit guarantee that represents an important credit enhancement mechanism, the originator still continues to bear the risks arising from the loans. Consistent with the view that securitizations do not lead to a shift of the risks of the underlying loans, Barth et al. (2012) show that the bond market perceive firm's credit risk as associated with both the retained and the non-retained portion of securitized assets. Moreover, Landsman et al. (2008) show that the stock market treats securitized assets and liabilities held by a SPE as belonging to the sponsor-originator. However, because of the lack of coordination among accounting standards, regulatory capital requirements and tax law, an originator can increase the income and the level of risk without increasing the required TIER 1.

Finally as the interest rate of the pool of loans increases, the earnings arising from a securitization increase too. Therefore the more the subprime loans securitized the greater the earnings realized, but because of the implicit and explicit guarantee provided by the originator bank, the earnings are deeply rooted into risks[2]. Additionally, securitizations with further involvement, as in the presence of retained interest, do not trigger a taxable sale event, thus generating a greater positive impact on income.

Because banks' risk profile is likely to be affected by CEO's equity compensation and most securitization transactions appear to be deeply rooted into risk, we analyze whether highly incentivized CEOs' used securitizations to reduce the perceived risk while betting on it. The idea

[2] Sidel et al. (2008) reported in the Wall Street Journal that Citigroup decide to provide emergency support for seven of its SPEs. As a consequence of this decision, Citigroup brought $49 billion of SPEs assets and related liabilities onto its balance sheet.

that compensation programs are one of the determinants of the misalignment of incentives and conflicts of interest that permeate the "securitization chain" has also been confirmed by the Bank for International Settlements (2011), thus making the research question even more intriguing and timely.

3.3 Testable Predictions

We develop our predictions distinguishing among two separate but complementary aspects of CEO's stock and option compensation: *equity* and *risk* incentives. Equity incentives are defined as the variation in executive's wealth caused by a change in stock price and therefore measure the strength of CEO's incentives to increase the value of firm's stock. Risk incentives, instead, are defined as the variation in executive's wealth caused by a change in stock price volatility and therefore measure the strength of CEO's incentives to increase firm's risk profile (Core et al., 2003).

Equity incentives and securitization activity

When securitization transactions qualify for *sale accounting*, as almost all securitizations did under SFAS 140, they offer several benefits that make them particularly appealing to the originator. First, securitization enables banks to optimally choose their exposure to the credit risk of loans generated (Jiangli and Pritsker 2008). In fact, through securitization activities banks can decide which loans to fund on balance sheet and which to sell outside. Second, securitization enables banks to replace illiquid loans with cash, thus improving banks' liquidity and multiplying banks' resources available for being invested in the lending activity. Furthermore, as previously discussed, if the financial institution is subject to regulatory capital requirements, securitization transactions under US GAAP allow to increase regulatory capital ratios and free up regulatory

capital. Third, securitization allows banks which are efficient in originating certain asset types, for instance credit card receivables, to improve market share without creating balance sheet concentration (Bank for International Settlements, 2011). Fourth, if an originator is able to achieve off-balance sheet accounting treatment, the removal of balance sheet assets improves certain financial ratios, such as the leverage capital ratio or return on assets. In addition, sales treatment could increase non-interest income, which combined with the capital requirements, improve the originator's return on equity (Bank for International Settlements, 2011). Fifth, securitization allows banks to increase their profitability through "gains on sale". In fact, under SFAS 140 banks could record a gain equal to the difference between the allocated book value of sold components and net proceeds from securitization. Moreover, as the interest rate of the pool of loans increases, the earnings arising from a securitization increase too. Thus, the more the subprime loans securitized the more the earnings realized. In fact subprime-mortgage-related positions, even the most junior, generally have experienced good investment performance as long as home prices appreciate and debt markets are sufficiently liquid (Ryan, 2008). Nonetheless, because of the implicit and explicit guarantee provided by the originator, the earnings are deeply rooted into risks.

In a nutshell, securitizations under US GAAP had the potential of greatly improving banks' shareholder value: simply put, securitization gives the bank more options for funding its activities and managing its risk profile and, all else equal, expanded opportunities should increase bank's value (Jiangli and Pritsker, 2008). Moreover, the profit opportunities offered by subprime securitizations have led experts in the industry to define these financial transactions as "a machine that just manufactures earnings out of thin air" (Browning, 2007). Given securitization's potentiality for boosting shareholder value, we conjecture that CEOs whose wealth is more tightly linked to firm's stock price have greater incentives to engage in securitization of risky and

non risky loans than CEOs with low equity incentives, in order to maximize the value of their equity holding. As a consequence, we posit the following research hypothesis:

H1: Equity incentives positively affect the securitization of risky and non risky loans

Risk incentives and subprime securitization activity

CEO's equity compensation can also influence the riskiness of the securitization transactions undertaken.

Suppose, for instance, that the bank can invest either in a subprime loan pool or in a prime loan pool, both with a duration of 10 years. If the bank chooses the subprime loans there is an α percent chance that the investment will create a wealth of W_0 in the next ten years and a $(1-\alpha)$ percent chance that the investment will create a wealth of W_2 in the same time period. Alternatively, the bank can grant the prime loans that create a wealth of W_1 with $\alpha = 100$, being $W_2 >> W_1 > W_0$. Since shareholders are well diversified they would prefer the risky scenario and betting on the possibility of increasing bank's wealth to W_2. In fact, as holders of a call option on the firm which can be exercised at any time when firm's equity exceed the value of debt (Merton, 1974), shareholders benefit entirely for the upside with limited losses on the downside. Thus, in companies with limited liability shareholders have a strong incentive to increase the riskiness of the investments. In order to induce CEOs to choose the risky scenario, shareholders can give CEOs option grants thus increasing their wealth sensitivity to changes in stock volatility. In this line, Coles et al. (2006) document that higher sensitivity of CEO wealth to stock volatility leads executives to implement riskier policy. Nonetheless, as stock and option-based compensation increases the executive's personal portfolio becomes less diversified and the executive becomes more risk averse and more likely to pursue strategies aimed at mitigating the risk of the

institution (Smith and Stulz, 1985). Moreover high levels of perceived risks can negatively affect a manager's tenure and job security (Ronen and Sadan, 1981; Carlson and Bathala, 1997) and can harm her reputational and human capital. As a consequence, it could be possible that, even if CEOs are provided with risk incentives, they prefer the low risk scenario that ensures W_1 instead of betting on risky lending activities that could deliver W_2 but also W_0.

The use of securitization allows to deeply change the timing of the pay-off for the undiversified executive in the presence of high risk incentives. In fact, the executive can choose to invest in the subprime loan pool and securitize it. In this scenario the bank *immediately* records the gains and revenues and get W_2 while the negative outcome W_0 remains delayed over time until the bank has to eventually record the loss on the retained interest. As a consequence, the securitization makes the risky scenario much more appealing to undiversified executives that are incentivized on risk. In fact, by changing the timing of the payoff, the securitization allows undiversified but risk incentivized CEOs to bet on risky scenarios while delaying any negative outcome related to them that might negatively affect their tenure, job security and human capital. This argument is consistent with results in Grant et al. (2009) showing that risk-averse managers incentivized to take risks smooth income with the goal to reduce the perceived risk and create accounting reserves to cover potential losses. Therefore we expect a positive relationship between CEO's risk incentives and the securitization of risky loans.

Thus we posit the following prediction:

H2: Risk incentives positively affect the securitization of risky loans

3.4 Data

Sample Selection

For the purpose of our analysis we identify all financial institutions (SIC codes between 6000-6300) available on Execucomp dataset in fiscal year 2003 and we keep all observations with an identifiable CEO throughout 2003-2009. In order to mitigate any possible survivorship bias, we augment our sample including financial institutions that have been delisted during the financial crisis but that have at least five years of data starting fiscal year 2003, thus assuring that we have information on these institutions at least until 2007 when the crisis has started. For our sample banks, we hand collect data on securitization activities from 10-K filings using disclosure under SFAS 140; we retrieve control variables from Compustat, Compustat Bank and CRSP; and we collect compensation data from Execucomp dataset and 10-K filings. We ended up with a final sample of 526 firm-year observations over the period 2003-2009 generated by 81 unique financial institutions. Table 3.1 describes the sample selection process and the distribution of observations over time. Out of 526 firm-year observations, about the 40% reports securitization transactions thus confirming that the use of securitization practices has been a concentrated phenomenon in the financial industry.

Variable Measurement

Securitization

We hand collect data on banks' securitization activities from 10-K filings. Specifically, we use disclosure under SFAS 140 that requires institutions to provide information on securitized financial assets[3]. In order to rule out the possibility that our analysis is driven by a size effect, we

[3] Two caveats apply. First, banks do not report data on non material securitizations and we consider these amounts equal to zero. On the contrary if the bank reports evidence of securitizations but the disclosure provided in the 10-K filing does not allow to

scale loans securitized by the amount of total loans managed by the bank (sum of total securitized and withheld loans) and create the variable *Securitization*. For financial institutions engaging in securitization transactions we also retrieve the amount of credit losses on securitized loans and we create a variable (*Loss Secur*) that computes the percentage of credit loss on securitized loans. We interpret this variable as a proxy of the riskiness of securitization transactions undertaken by the bank. Given that most losses on securitized assets have been recorded during the financial crisis, it is an essential feature of our research design to collect data until 2009 and not limiting the analysis to the pre-crisis period[4].

TABLE 3.1
Sample Selection and Composition

Financial institutions (SIC codes between 6000-6300) available on Execucomp dataset in fiscal year 2003	670	
minus		
Financial institutions with missing information on securitization	128	
Financial institutions with missing information on other variables	16	
Firm-Year Observations	**526**	
Unique Firms	**81**	

Year	**# obs**
2003	78
2004	76
2005	76
2006	78
2007	79
2008	72
2009	67
Total	**526**

Firm-year observazions without securitizations	318	60%
Firm-year observazions with securitizations	208	40%
Total	**526**	**100%**

understand the exact amount of assets securitized the observation is deleted. Second, disclosure under SFAS 140 applies to securitization transactions in which the bank has retained interests. Since this is the case for most securitizations the effect on the analysis is trivial.

[4] We limit the analysis to 2009 because starting from fiscal year 2010 new accounting standards for securitization apply and this would affect the analysis.

Similarly, we create a proxy of the riskiness of non-securitized loans (*Loss Loans*) defined as the percentage losses on loans withheld on balance sheet. Finally, we define a variable (*Diff in Losses*) that computes the difference between the percentage loss on securitized assets and the percentage loss on withheld loans. Thus, higher values of *Diff in Losses* indicate that executives transferred risk embedded in loans to outside investors through securitization.

CEO's incentives

As emphasized by Core et al. (2003), executive incentives from stocks and options are properly measured only considering portfolio incentives. In fact, the amount of newly granted restricted stocks and options is not sufficient for evaluating the amount of incentives the executive is provided with (Yermack 1995). We measure CEO's equity incentives (*Equity Incentives*) as the dollar change in the value of executive's stock and option holdings that would come from a one percentage point increase in the company stock price. The sensitivity of CEO's *stock* holding is simply computed multiplying the number of shares held by the 1% of the stock price at fiscal year-end, while for computing the sensitivity of CEO's *option* holding we take the partial derivative of the Black-Scholes equation with respect to stock price (option's Delta) as shown in Appendix A. Starting from the fiscal year 2006, Execucomp reports all the information necessary for computing the sensitivity of CEO's equity portfolio to a one percentage point increase in the stock price. For observations preceding 2006 we use Core and Guay (2002)'s methodology for estimating the delta of executives' option portfolio. In particular, CEO's options are divided into three groups (options awarded during the year, options awarded in previous years but not yet exercisable and options granted in previous years and currently exercisable) and separate estimates of the delta are computed. Core and Guay (2002) show that their proxy captures more

than 99% of the variation in option portfolio value and sensitivity. To reduce the influence of extreme values, in regression analyses we use the log transformation of Equity Incentives.

We measure CEO risk-related incentives (*Risk Incentives*) in a methodology similar to that used by Rogers (2002, 2005) and Grant et al. (2009), namely the Vega of CEO's stock options divided by their Delta. We compute CEO's option Vega as the sensitivity of CEO's option holding to a unit change in stock price volatility by using the first derivative of the Black-Scholes option-pricing model in relation to firm's volatility as described in Appendix A. When necessary we used Core and Guay (2002)'s methodology to retrieve the data for computing options' Vega and Delta. Computing CEO's risk-incentives using the Vega-to-Delta ratio has the advantage of reducing multicollinearity problems between the sensitivity of CEO's equity portfolio to stock price and stock volatility that is particularly severe in small samples.

In the analysis we also control for the age of the CEO (*Log Age*). Including CEO's age in the analysis allows us to control for potential effects linked to CEO's career concerns that might influence securitization activities. The underlying idea is that career concerns are higher for young versus old managers since they have to influence market's beliefs about their ability (Holmström, 1999).

Bank's characteristics

In an attempt to control for confounding variables that might influence the level of securitization observed, we include in the multivariate analysis a set of bank-related characteristics. *B_M* is the equity book-to-market ratio computed as the book value of equity divided by its market value at fiscal year-end; *Returns* is bank's annual market returns; *Size* is the natural logarithm of total assets; *Change Assets* is the percentage change in total assets with respect to the previous year as control for potential M&A activities; *Change Tier 1* proxies for regulatory capital constraints and

it is computed as the percentage change in Tier 1 with respect to the previous year; *Interest Income* is net interest income divided by total revenues as a proxy for bank business model; *GDP* is the gross domestic product that controls for macroeconomics trends that might influence securitization activities.

Descriptive Statistics and Correlations

Table 3.2, Panel A reports descriptive statistics of the main variables used in the analysis while Panel B presents Pearson correlation coefficients. Data on *Securitization* show that, on average, financial institutions in our final sample securitize about the 11% of managed loans. The highly asymmetric distribution of the variable is driven by a large part of observations taking value of zero because of no (or immaterial) securitization activities[5]. When computed only considering banks involved in securitization transactions, untabulated results show that the average value of *Securitization* is 0.27 with banks in the 90th percentile securitizing an amount of loans equal to the 64% of the managed portfolio. Our research design aims at exploiting this variability in the data in order to analyze if CEO's incentives can explain part of it.

As expected, the correlation matrix reported in Panel B shows that old CEOs and CEOs in large bank have higher levels of equity incentives than their colleagues that are in the early stage of the career or that guide small institutions. The level of equity incentives is also strongly positively correlated with bank's performance and growth opportunities while the relation reverses sign when examining risk incentives. On the contrary, large financial institutions provide CEOs not only with high levels of equity incentives but also with high risk incentives with respect to small banks.

[5] We incorporate this feature of the data in our empirical analysis by using Tobit models.

TABLE 3.2
Descriptive Statistics and Correlations

Panel A: Descriptive Statistics of the main variables

	N	Mean	SD	p25	p50	p75
Securitization	526	0.107	0.204	0.000	0.000	0.108
Diff in Losses	162	0.007	0.023	-0.005	0.000	0.019
Equity Incentives	526	5.786	1.786	4.849	5.947	7.033
Risk Incentives	526	0.905	0.721	0.400	0.783	1.209
Log Age	526	4.031	0.115	3.951	4.043	4.111
B_M	526	0.806	0.881	0.399	0.550	0.822
Returns	526	0.033	0.395	-0.120	0.096	0.238
Size	526	10.175	1.717	8.919	9.905	11.348
Change Assets	526	0.112	0.171	0.014	0.084	0.170
Change Tier 1	526	0.026	0.185	-0.062	0.000	0.078
Interest Income	526	0.427	0.164	0.334	0.434	0.534

Panel B: Correlation Matrix

	1	2	3	4	5	6	7	8	9	10
1 Securitization	1.000									
2 Diff in Losses	0.121	1.000								
3 Equity Incentives	0.271***	0.073	1.000							
4 Risk Incentives	0.046	0.068	-0.267***	1.000						
5 Log Age	-0.185***	-0.195*	0.216***	-0.034	1.000					
6 B_M	0.011	0.043	-0.361***	0.480***	0.007	1.000				
7 Returns	0.011	0.078	0.249***	-0.494***	0.010	-0.496***	1.000			
8 Size	0.396***	0.100	0.432***	0.231***	0.061	0.018	-0.099*	1.000		
9 Change Assets	0.086*	0.071	0.265***	-0.207***	0.007	-0.223***	0.198***	0.060	1.000	
10 Change Tier 1	-0.001	-0.015	-0.067	0.120**	-0.002	0.110*	0.005	0.024	-0.090*	1.000
11 Interest Income	-0.307***	-0.040	-0.286***	-0.021	-0.059	-0.052	0.056	-0.435***	-0.003	0.031

Panel A presents descriptive statistics for the main variables included in the analysis while Panel B reports Pearson correlation coefficients. Variable definition in Appendix 3.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively. P-values are two tailed.

3.5 Empirical Analyses

Our two research hypotheses predict that CEO's equity incentives determine both the total amount of securitizations undertaken by financial institutions *and* the quality of loans securitized, while risk-related incentives only determine the securitization of risky loans.

To test the effect of equity compensation on banks' total securitization activities, we first group banks into quintiles according to the level of CEO's equity incentives and report the amount of securitization for each group of financial institutions. Table 3.3, Panel A shows that as one moves from the first to the fifth quintile of the distribution of CEO's equity incentives, the amount of loans securitized steadily increases, thus providing preliminary support for the role of CEO's equity incentives in boosting securitizations. To better investigate H1 we estimate the following Tobit model with year fixed effects and heteroskedasticity-robust standard errors clustered at firm-level:

$$\begin{aligned} Securitization_{i,t} = {} & \alpha_0 + \alpha_1 Equity\ Incentives_{i,t} + \alpha_2 Risk\ Incentives_{i,t} + \alpha_3 Log\ Age_{i,t} + \alpha_4 B\_M_{i,t} + \\ & \alpha_5 Returns_{i,t} + \alpha_6 Size_{i,t} + \alpha_7 Change\ Assets_{i,t} + \alpha_8 Change\ Tier\ 1_{i,t} + \alpha_9 Interest \\ & Income_{i,t} + \alpha_{10} GDP_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where *i,t* indicate, respectively, firm and year observations and all the variables have already been defined. Our research hypotheses predict a positive and significant α_1 and an insignificant α_2. When estimating (1), it is necessary to use a censored regression model because *Securitization* takes the value of zero for a large part of the sample and it is a continuous random variable over strictly positive values. As a consequence a linear model would not work properly (Wooldridge, 2002).

The results from equation (1), reported in columns 1 in Panel B of Table 3.3, strongly support H1 documenting a positive and significant relation between securitization and CEO's equity incentives; while no relation is detected between securitization and CEO's risk incentives. Given the variability in the distribution of the dependent variable, it could be argued that results might be partially driven by some extreme observations. In order to address this concern we divide our sample in three groups and mark them with an ordering variable taking the value of:

- 1 if the bank does not engage into securitizations;
- 2 if the bank engages into securitizations and *Securitization* is below the sample median of securitizing institutions;
- 3 if the bank engages into securitizations and *Securitization* is above the sample median of securitizing institutions.

We then fit equation (1) using an ordered probit model and present results in columns 2 of Table 3.3, Panel B. The advantage of using this approach is that results cannot be driven by few outliers; nonetheless the use of an ordering variable reduces information available in the data. Column 3, instead, fits model (1) excluding observations in years 2008 and 2009. This additional analysis takes into consideration the fact that the securitization market greatly reduced after 2007, because of the advent of the financial crisis. Also these alternative model specifications provide strong support for H1, suggesting that CEOs with high equity incentives have engaged in securitization transactions to a larger extent than CEOs whose wealth was less tightly linked to shareholder value.

TABLE 3.3
CEO Incentives and Securitization

Panel A

Equity Incentives Quintile	**Securitization** *Mean (N=526)*
Lowest	0.032
2nd quintile	0.070
3rd quintile	0.083
4th quintile	0.140
Highest	0.212
H_0: Lowest - Highest = 0	**t = - 7.038** **p-value = 0.000**

Panel B

Dependent Variable:	**Securitization** *Continuous variable* **Tobit**	**Securitization** *Three Groups* **Ordered Probit**	**Securitization** *Until 2007* **Tobit**
	(1)	**(2)**	**(3)**
Equity Incentives	0.072***	0.217***	0.095***
	[0.026]	[0.083]	[0.032]
Risk Incentives	0.026	0.069	0.017
	[0.044]	[0.142]	[0.060]
Log Age	-1.081***	-3.090***	-1.078***
	[0.366]	[1.036]	[0.391]
B_M	0.081**	0.268**	0.235*
	[0.033]	[0.118]	[0.127]
Returns	0.030	0.089	0.002
	[0.045]	[0.153]	[0.106]
Size	0.098***	0.412***	0.079***
	[0.024]	[0.077]	[0.029]
Change Assets	0.019	0.015	0.032
	[0.118]	[0.410]	[0.122]
Change Tier 1	0.043	0.136	0.008
	[0.076]	[0.257]	[0.104]
Interest Income	-0.355	-0.886	-0.339
	[0.226]	[0.828]	[0.255]
GDP	-0.076	-0.096	-0.145
	[0.151]	[0.448]	[0.088]
Year Dummies	YES	YES	YES
Observations	526	526	387
(Pseudo) R^2	40.6%	25.7%	40.7%

Panel A tabulates the amount of securitization according to the quintile of the distribution of CEO's equity incentives. Panel B reports estimate results from model (1).
Variable definition in Appendix 3.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively. Heteroskedasticity-robust standard errors clustered at firm-level are reported in brackets. P-values are two tailed.

Results from Table 3.3 also show that banks with higher book-to-market ratios engage more in securitizations than financial institutions with lower book-to-market ratios. A possible explanation is that these banks have higher incentives to securitize loans because they have lower growth opportunities and thus more difficulties in collecting funds. Data also show that old CEOs undertake less securitizations than their young colleagues, and this is consistent with young managers having higher career concerns and thus trying to boost shareholder value through securitizations to a larger extent.

A possible concern that might arise when estimating equation (1) relates to the fact that CEO's equity and risk incentives can be endogenous with respect to banks' decision of engaging into securitizations. This is the case if exogenous shocks to the regression residuals affect both CEO's compensation structure and securitization strategies. Moreover model (1) might be affected by a reverse causality bias. To address this problem we use an instrumental variable (IV) approach. It is well known that the challenge faced by researchers when dealing with IV models is to identify valid and strong instruments. These are variables that are strongly correlated with the endogenous variable under investigation but that are not correlated with the error term in the second stage equation[6]. In order to identify such an instrument we exploit a change in US GAAP that took place in 2000. Here it is important to note that i) the securitization business model and ii) the subprime securitization market, developed thanks to the possibility offered by SFAS 140 to retain interests in securitized assets as credit enhancement mechanism and applying *sale accounting* to the transferred assets. This was possible thanks to the *Financial Components Concept* included in SFAS 140. Without this concept most securitizations would have to be accounted for as secured borrowing. The Financial Components Concept has been introduced in 2000 by SFAS 140 while the prior SFAS 125, *Accounting for Transfers and Servicing of Financial Assets and*

[6] See Larcker and Rusticus (2010) for a useful discussion of the use of instrumental variables in research

Extinguishment of Liabilities (1996) did not contain this provision. As a consequence, the recent securitization and subprime business model investigated in the paper has emerged after this change in accounting standards. Data reported in Table 3.4 document that after the discussed change in accounting standards in 2000, the securitization market sharply increased, specifically the subprime securitization market was almost non-existing beforehand. Thus, we use as instrument for CEO's equity and risk incentives during the period 2003-2009 the level of equity and risk incentives that the *same* CEO had before 2000[7]. The level of incentives held by the CEO in the same bank (or in the other banks/firms in which she has served) before 2000 is likely to be correlated with her future level of incentives but cannot be correlated with a securitization business model that did not exist[8].

TABLE 3.4
Securitization of Home Mortgages pre and post 2000

Dollars in Billions

Year	Prime MBS	Subprime MBS	Total MBS	Average 1997-1999 Prime MBS	Average 1997-1999 Subprime MBS	Average 1997-1999 Total MBS
1997	423	66	489	687	70	756
1998	860	83	943			
1999	777	60	837			
2001	1,246	98	1,345	**Average 2001-2007**	**Average 2001-2007**	**Average 2001-2007**
2002	1,641	176	1,817	**Prime MBS**	**Subprime MBS**	**Total MBS**
2003	2,393	269	2,662	1,496	444	1,940
2004	1,306	521	1,827			
2005	1,314	797	2,112	**% Increase w.r.t. pre 2000**		
2006	1,202	814	2,016	118%	539%	157%
2007	1,372	433	1,804			

Data have been retrieved from *Inside Mortgage Finance Publication.* MBS is the acronym of Mortgage-Backed Securities

Table 3.5 presents results from estimating model (1) using a two-stage least squares (2SLS) approach. The high R^2 reported in the first stage suggest that variables included in the model are good predictors of the endogenous variables.

[7] Due to data limitation we have considered compensation data back to 1992.

[8] Even if data reported in Table 3.4 corroborate the assumption that the securitization business model that has generated the financial crisis (and that is under investigation in this paper) came to existence only after the introduction of SFAS 140, we cannot ignore the fact that securitization transactions were also present before 2000. As a consequence we acknowledge that our instruments are likely to be *semi-endogenous* and not perfectly exogenous (Larcker and Rusticus 2010).

TABLE 3.5
CEO Incentives and Securitization with Endogeneity

Dependent Variable:	*Second Stage*			*First Stage*	
	Securitization *Continuous variable* **Tobit IV**	**Securitization** *Three Groups* **Ordered Logit IV**	**Securitization** *Until 2007* **Tobit IV**	**Equity Incentives**	**Risk Incentives**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Equity Incentives Prior 2000				0.639***	-0.032
				[0.062]	[0.026]
Risk Incentives Prior 2000				0.737***	0.563***
				[0.268]	[0.114]
Equity Incentives	0.156**	0.606***	0.163**		
	[0.062]	[0.229]	[0.072]		
Risk Incentives	0.222	0.540	0.191		
	[0.316]	[0.930]	[0.322]		
Log Age	-1.329***	-4.317***	-1.329***	1.988***	-0.022
	[0.412]	[1.217]	[0.508]	[0.477]	[0.203]
B_M	0.087*	0.355**	0.209	-0.377***	0.156***
	[0.046]	[0.166]	[0.252]	[0.079]	[0.034]
Returns	0.060	0.040	0.304*	0.511***	-0.418***
	[0.122]	[0.375]	[0.159]	[0.189]	[0.081]
Size	0.040	0.205	0.029	0.318***	0.104***
	[0.055]	[0.171]	[0.058]	[0.036]	[0.015]
Change Assets	-0.045	-0.367	-0.023	1.388***	-0.360**
	[0.164]	[0.534]	[0.204]	[0.334]	[0.142]
Change Tier 1	0.027	0.070	-0.095	0.337	0.002
	[0.074]	[0.252]	[0.107]	[0.313]	[0.133]
Interest Income	-0.337	-0.644	-0.344	-0.885**	0.347**
	[0.273]	[0.914]	[0.329]	[0.378]	[0.161]
GDP	-0.299	-0.854	-0.004	-0.165**	0.151***
	[0.294]	[0.845]	[0.041]	[0.077]	[0.033]
Year Dummies	YES	YES	YES	YES	YES
Observations	526	526	387	526	526
(Pseudo) R^2	39.8%	26.3%	37.5%	54.3%	49.3%

The table reports the first and second stage estimates from model (1) using a 2SLS approach. We use as instrument for CEO's equity incentives the level of equity incentives the same CEO had before 2000 (Equity Incentives Prior 2000) and as instrument for CEO's risk incentives the level of risk incentives the same CEO had before 2000 (Risk Incentives Prior 2000). Variable definition in Appendix 3.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively. Heteroskedasticity-robust standard errors clustered at firm-level are reported in brackets. P-values are two tailed.

Estimate results from the second stage strongly corroborate findings reported in Table 3.3 and thus confirm the support to H1.

We now move the focus of the analysis from banks' overall securitization activity to the *quality* of loans securitized and banks' decision to transfer risks to outside investors through securitization.

Table 3.6 provides univariate support for our hypothesis that CEO's equity and risk incentives motivate executives to securitize low-quality assets and transfer risk to outside investors through securitization. Specifically, we divide the sample into four groups according to the median value of CEO's equity and risk incentives (High *vs* Low)[9]. Table 3.6, Panel A tabulates the mean values of the percentage loss on securitized loans (*Loss Secur*) for each level of CEO's incentives while Panel B tabulates the difference between the percentage loss on securitized loans and withheld loans (*Diff in Losses*). We interpret the first metric as a proxy of the riskiness of loans securitized because risky securitized loans are more likely to suffer credit losses. The second metric, instead, investigates the opportunistic behavior of CEOs when engaging into securitizations, because it compares the losses recorded on loans transferred off-balance with losses on loans withheld in the balance sheet. Data from Table 3.6, Panel A indicate that financial institutions in which the CEO had high equity and risk incentives (group High/High) engaged in risky securitization transactions to a larger extent than banks in which the CEO had low incentives (group Low/Low). Similarly, Panel B shows that CEOs with high equity and risk incentives are more likely to transfer risk to outside investors than CEOs with low incentives as documented by the significantly higher value of *Diff in Losses* in the group High/High w.r.t. the group Low/Low.

[9] The sample size is 162 because we have to restrict the analysis to those observations with available data on losses on securitized loans.

TABLE 3.6
CEO Incentives and Losses on Securitization

Panel A **Loss Secur**

Mean

N= 162

		Risk Incentives	
		High	*Low*
Equity Incentives	*High*	**0.031**	**0.017**
	Low	**0.017**	**0.009**

H_0: (High/High) = (Low/Low) **t = 3.301** **p-value= 0.002**

Panel B **Diff in Losses**

Mean

N= 162

		Risk Incentives	
		High	*Low*
Equity Incentives	*High*	**0.017**	**0.006**
	Low	**0.003**	**0.003**

H_0: (High/High) = (Low/Low) **t = 2.402** **p-value= 0.020**

The table has been created by classifying observations with available data on losses on securitized loans (N=162) into four groups (High/High, High/Low, Low/High, Low/Low) according to the median value of CEO's equity and risk incentives. Panel A reports, for each group, the mean value of the percentage loss on securitized loans (*Loss Secur*) while Panel B reports the mean value of the difference between the percentage loss on securitized loans and withheld loans (*Diff in Losses)* . Variable definition in Appendix 3.B. P-values are two tailed.

In order to better disentangle the effect of CEO's equity and risk incentives on the quality of loans transferred off-balance through securitization we estimate the following model through 2SLS:

$$\textit{Loss Secur (Diff in Losses)}_{i,t} = \beta_0 + \beta_1 \textit{Equity Incentives}_{i,t} + \beta_2 \textit{Risk Incentives}_{i,t} + \beta_3 \textit{Log Age}_{i,t} + \beta_4 B\_M_{i,t} + \beta_5 \textit{Returns}_{i,t} + \beta_6 \textit{Size}_{i,t} + \beta_7 \textit{Change Assets}_{i,t} + \beta_8 \textit{Change Tier 1}_{i,t} + \beta_9 \textit{Interest Income}_{i,t} + \beta_{10} GDP_{i,t} + \beta_{11} \textit{Loss Loans}_{i,t} + \varepsilon_{i,t} \quad (2)$$

Estimate results using *Loss Secur* as dependent variable are reported in Table 3.7, Columns 1 while Columns 2 reports results from using *Diff in Losses* as dependent variable.

TABLE 3.7
CEO Incentives and Risky Securitization

Dependent Variable:	**Loss Secur**	**Diff in Losses**
	2SLS	2SLS
	(1)	**(2)**
Equity Incentives	0.008**	0.007**
	[0.004]	[0.003]
Risk Incentives	0.025**	0.025**
	[0.011]	[0.011]
Log Age	-0.064***	-0.060***
	[0.022]	[0.020]
B_M	-0.000	-0.000
	[0.001]	[0.001]
Returns	0.001	0.002
	[0.007]	[0.007]
Size	-0.002	-0.002
	[0.004]	[0.004]
Change Assets	0.014	0.018
	[0.014]	[0.013]
Change Tier 1	0.019	0.019
	[0.011]	[0.011]
Interest Income	0.003	0.008
	[0.020]	[0.019]
GDP	-0.010**	-0.012**
	[0.005]	[0.004]
Loss Loans	0.812***	
	[0.202]	
Year Dummies	YES	YES
Observations	162	162
R^2	43.6%	19.0%

The table reports second-stage estimate results from model (2) estimated through 2SLS. In the untabulated first-stage we use as instrument for CEO's equity incentives the level of equity incentives the same CEO had before 2000 and as instrument for CEO's risk incentives the level of risk incentives the same CEO had before 2000. Variable definition in Appendix 3.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively. Heteroskedasticity-robust standard errors clustered at firm-level are reported in brackets. P-values are two tailed.

The coefficients on *Equity Incentives* and *Risk Incentives* in the first column of the table indicate that CEOs with high equity and risk incentives tended to securitize risky loans that are more likely to record credit losses. Moreover, results from the second column provide evidence that equity and risk incentives motivated CEOs to transfer the riskiest loans to outside investors while keeping on balance sheet the safest ones. These results are consistent with both H1 and H2 claiming that CEOs incentivized on equity and risk were motivated to engage in risky lending activities and to use securitization as an accounting tool for hiding the risk generated from the balance sheet. Thus, the analysis provides evidence that CEO's equity and risk incentives motivated executives to opportunistically clean their balance sheets from undesired risks through securitization. Ex post, it is possible to affirm that securitization practices were effective in hiding the risks undertaken by CEOs, since neither banks' investors nor analysts were able to understand the risks embedded in securitization transactions and in the underlying lending activity.

Results from the previous analyses suggest that CEO's equity incentives are both a determinant of banks' overall securitization activities and the riskiness of securitized loans, while CEO's risk incentives only determine the risk profile of securitization. We further investigate this point by retrieving data on financial institutions most involved in the securitization of *subprime* loans. Subprime loans are made to those who have impaired credit and their securitization is the riskiest form of securitization transactions undertaken by financial institutions. Typically, subprime borrowers have low credit ratings and a reasonable chance of defaulting on the debt repayment: as a consequence, financial institutions charge significantly higher rates on subprime loans than prime mortgages. This allowed banks to increase their profits from the lending activity and also provided banks with high incentives to include these loans in securitization transactions in order to transfer the associated high risk to outside investors. We retrieve data on the top subprime securitizers from the *Mortgage Market Statistical Annual* edited by *Inside Mortgage Finance*

Publications. We have data on top subprime securitizers for the period 2000-2007. Even if the *Mortgage Market Statistical Annual* only reports data for the top financial institutions involved in subprime securitizations, it has a very wide coverage of the securitization market with top subprime securitizers disclosed in the dataset covering more than the 80% of overall subprime market. We define a dummy variable (*Top Subprime*) taking the value of 1 if the financial institution is listed in the *Mortgage Market Statistical Annual* as top subprime securitizer at least once during the period analyzed, zero otherwise. Table 3.8, Panel A compares the percentage of top subprime observations according to the level of CEO's equity and risk incentives. Two-sample tests of proportion indicates that, in the presence of high CEO's equity and risk incentives the percentage of top subprime securitizers is significantly higher than in the presence of low CEO's incentives.

TABLE 3.8
CEO Incentives and Subprime Securitization

Panel A **% Top Subprime**

		Risk Incentives	
		High	*Low*
Equity Incentives	*High*	**46%**	**38%**
	Low	**16%**	**0%**

H_0: (High/High) = (Low/Low) z = 5.550 p-value < 0.000

The table has been created by classifying observations into four groups (High/High, High/Low, Low/High, Low/Low) according to the median value of CEO's equity and risk incentives. A financial institution is classified as top subprime securitizer if it is disclosed as such in the *Mortgage Market Statistical Annual* edited by *Inside Mortgage Finance Publications*. Variable definition in Appendix 3.B. P-values are two tailed.

To investigate in a multivariate setting if CEO's equity and risk incentives increase banks' probability of being a securitizer of subprime loans we estimate model (1) through 2SLS using as dependent variable the dummy *Top Subprime* above defined:

$$Top\ Subprime_{i,t} = \gamma_0 + \gamma_1\, Equity\ Incentives_{i,t} + \gamma_2\, Risk\ Incentives_{i,t} + \gamma_3\, Log\ Age_{i,t} + \gamma_4\, B\_M_{i,t} + \gamma_5\, Returns_{i,t} + \gamma_6\, Size_{i,t} + \gamma_7\, Change\ Assets_{i,t} + \gamma_8\, Change\ Tier\ 1_{i,t} + \gamma_9\, Interest\ Income_{i,t} + \gamma_{10}\, GDP_{i,t} + \varepsilon_{i,t} \quad (3)$$

Estimate results are reported in Table 3.8, Panel B. Column 1 presents results for the full sample, column 2 restricts the sample to 2007, column 3 uses the full time period but tabulate results using only securitizing banks, and the last column uses securitizing financial institutions only and restricts the sample to 2007. Results on CEO's equity and risk incentives corroborate findings from panel A and suggest that CEOs with high equity and risk incentives are more likely to engage in the securitization of subprime loans than executives with low incentives. Therefore results support both H1 and H2 pointing out to the pivotal role of CEO's equity and risk incentives in boosting risky securitizations.

In order to further investigate the opportunistic behavior of highly incentivized CEOs when engaging into securitizations, we analyze bank's disclosure about the amount of losses recorded by loans that have been transferred off-balance. SFAS 140 explicitly requires an entity that securitizes financial assets to disclose information about the quality of securitized assets, including the amount of credit losses[10]. Specifically we investigate if CEOs with high equity and risk incentives not only engaged in risky securitization transactions but also hid the quality of loans securitized by providing external investors with less information about the riskiness of securitizations undertaken.

[10] Also in this case the requirement applies to securitizations with retained interests.

TABLE 3.8
Subprime Securitization

Panel B

Dependent Variable:	**Top Subprime**	**Top Subprime**	**Top Subprime**	**Top Subprime**
	Full Sample	*Full Sample Until 2007*	*Only Securitizers*	*Only Securitizers Until 2007*
	2SLS	*2SLS*	*2SLS*	*2SLS*
	(1)	**(2)**	**(3)**	**(4)**
Equity Incentives	1.065***	0.936***	0.915***	0.911**
	[0.361]	[0.331]	[0.298]	[0.387]
Risk Incentives	3.797***	3.535**	2.708**	3.460*
	[1.471]	[1.714]	[1.284]	[1.845]
Log Age	-1.908	0.114	-0.643	0.216
	[2.550]	[2.149]	[2.201]	[2.825]
B_M	-0.051	1.868***	-0.102*	2.590**
	[0.052]	[0.715]	[0.060]	[1.143]
Returns	1.109*	1.840**	0.794	3.048**
	[0.640]	[0.872]	[0.695]	[1.232]
Size	0.271	0.602***	0.467**	0.487**
	[0.243]	[0.205]	[0.221]	[0.205]
Change Assets	0.099	0.848	0.835	0.071
	[0.812]	[0.937]	[0.912]	[1.183]
Change Tier 1	0.470	-0.569	1.383*	0.330
	[0.607]	[0.554]	[0.715]	[0.850]
Interest Income	-0.247	-0.620	0.644	-0.761
	[1.566]	[1.535]	[1.724]	[1.688]
GDP	-4.474***	-2.838**	-4.855***	-1.925*
	[1.305]	[1.355]	[1.621]	[1.096]
Year Dummies	YES	YES	YES	YES
Observations	526	387	208	163
Pseudo R^2	61.8%	68.4%	50.1%	58.6%

The table reports second-stage estimate results from probit model (3) estimated through 2SLS. In the untabulated first-stage we use as instrument for CEO's equity incentives the level of equity incentives the same CEO had before 2000 and as instrument for CEO's risk incentives the level of risk incentives the same CEO had before 2000. Variable definition in Appendix 3.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively. Heteroskedasticity-robust standard errors clustered at firm-level are reported in brackets. P-values are two tailed.

For doing so we analyze the disclosure provided by financial institutions in their financial statements and score the quality of information on losses recorded on securitized loans on a 4-points scale as follows (*Disclosure Index*):

- 4 points if the amount of losses on securitized assets is disclosed in a table and the information is provided for each type of securitized asset (e.g. mortgages, credit cards etc…);
- 3 points if the amount of losses on securitized assets is disclosed in a table but the information is only provided at an aggregate level;
- 2 points if the amount of losses on securitized assets is not disclosed in a table and it has to be *indirectly* retrieved from information provided in the financial statements;
- 1 point if it is not possible to understand the amount of losses on securitized assets.

The median value of the *Disclosure Index* is 2.21 with a standard deviation of 1.06. In order to investigate the role of CEOs equity and risk incentives on the quality of information provided to investors, we estimate the following ordered probit model through 2SLS:

$$\begin{aligned} \textit{Disclosure Index}_{i,t} = {} & \delta_0 + \delta_1 \textit{Equity Incentives}_{i,t} + \delta_2 \textit{Risk Incentives}_{i,t} + \delta_3 \textit{Log Age}_{i,t} + \delta_4 \textit{B\_M}_{i,t} + \\ & \delta_5 \textit{Returns}_{i,t} + \delta_6 \textit{Size}_{i,t} + \delta_7 \textit{Change Assets}_{i,t} + \delta_8 \textit{Change Tier 1}_{i,t} + \delta_9 \textit{Interest Income}_{i,t} + \\ & \delta_{10} \textit{GDP}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (4)$$

Estimate results are reported in Table 3.9.

TABLE 3.9
CEO Incentives and Disclosure

Dependent Variable:	**Disclosure Index** *2SLS*
Equity Incentives	0.134
	[0.105]
Risk Incentives	-1.857**
	[0.731]
Log Age	-0.608
	[1.553]
B_M	0.216*
	[0.128]
Returns	-0.593
	[0.584]
Size	0.324**
	[0.143]
Change Assets	-2.897***
	[0.746]
Change Tier 1	-0.925
	[0.634]
Interest Income	-0.335
	[1.431]
GDP	4.349***
	[1.638]
Year Dummies	YES
Observations	208
Pseudo R^2	8.2%

The table reports second-stage estimate results from the ordered probit model (4), estimated through 2SLS. In the untabulated first-stage we use as instrument for CEO's equity incentives the level of equity incentives the same CEO had before 2000 and as instrument for CEO's risk incentives the level of risk incentives the same CEO had before 2000.

Variable definition in Appendix 3.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively. Heteroskedasticity-robust standard errors clustered at firm-level are reported in brackets. P-values are two tailed.

The coefficient on CEO's risk incentives is negative and significant indicating that CEOs with high risk incentives not only securitized risky loans to a larger extent than CEOs with lower incentives, but they also provided external investors with lower information about the quality of loans securitized. On the contrary, we do not find the same effect when examining CEO's equity incentives. This last result nicely fits with findings from Table 3.5 suggesting that CEO's equity incentives, contrary to risk incentives, determine overall securitization activity and not only the securitization of risky loans. Results reported in Table 3.9 further confirm the opportunistic behavior of CEOs when they engage into securitization transaction, motivated by the structure of their incentive scheme.

Finally, we test if banks involved in the subprime securitization indeed over performed other financial institutions before the crash of the subprime market in 2007 and if this relation changed once the subprime crisis has blew up. To shed light on this issue, we analyze how stock returns and earnings per share of top subprime securitizers changed before and after 2007, with respect to other financial institution. Specifically, we fit the following OLS model in which the variable *Crisis* is a dummy that takes the value of 1 in years 2007-2009, zero otherwise, and *Performance* is either annual market returns or earnings per share (EPS).

$$\begin{aligned} Performance_{i,t} = {} & \lambda_0 + \lambda_1 Crisis_{i,t} + \lambda_2 Top\ Subprime_{i,t} + \lambda_3 Crisis{*}Top\ Subprime_{i,t} + \lambda_4 B\_M_{i,t} + \\ & \lambda_5 Size_{i,t} + \lambda_6 Change\ Assets_{i,t} + \lambda_7 Change\ Tier\ 1_{i,t} + \lambda_8 Interest\ Income_{i,t} + \\ & \lambda_9 Securitization_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{5}$$

Estimate results are reported in Table 3.10, Columns 1 and 2.

TABLE 3.10
Securitization and Performance

	Market Returns (1)	EPS (2)	Dividends (3)
Crisis	-0.176***	-0.966***	0.041
	[0.023]	[0.337]	[0.043]
Top Subprime	0.107***	2.068***	0.341*
	[0.036]	[0.526]	[0.178]
Top Subprime * Crisis	-0.158*	-2.801**	0.189
	[0.080]	[1.331]	[0.141]
B_M	-0.192***	-1.428***	-0.127***
	[0.026]	[0.335]	[0.035]
Size	-0.030**	0.087	0.186***
	[0.013]	[0.116]	[0.038]
Change Assets	0.124	1.633*	-0.582***
	[0.079]	[0.828]	[0.141]
Change Tier 1	0.219***	1.038	0.017
	[0.082]	[0.669]	[0.098]
Interest Income	0.029	0.156	0.689***
	[0.129]	[0.955]	[0.233]
Securitization	0.071	0.462	-0.310
	[0.063]	[0.908]	[0.234]
Observations	526	526	526
R^2	34.8%	39.8%	39.3%

The table reports OLS estimate results from model (5). Market returns are monthly returns cumulated over the year; EPS is earnings per share, Dividends is dividends per share; Crisis is a dummy variable taking the value of 1 in years 2007-2009, zero otherwise;
Variable definition in Appendix 3.B. *,**,*** indicate statistical significance at 10%, 5%, 1% level, respectively. Heteroskedasticity-robust standard errors clustered at firm-level are reported in brackets. P-values are two tailed.

The positive and significant coefficient on *Top Subprime* indicates that subprime securitizers, before 2007, have performed much better than the other financial institutions. The negative coefficient on the dummy marking years 2007-2009 confirms the strong reduction in market returns and earnings recorded by all financial institutions with the advent of the credit crisis.

Interestingly the interaction term between *Top Subprime* and the crisis dummy is negative and significant, thus suggesting that the decrease in performance after 2007 has been more severe for banks that had engaged in the securitization of non-agency loans. These results further corroborates the role of subprime securitization in boosting stock prices and earnings before the advent of the subprime mortgage crisis and in deteriorating performance once the market has crashed. Finally, Table 3.10, Column 3 analyzes dividend distribution. This analysis is particularly interesting since dividend polices represent the core of the shareholder-bondholder conflict, which is exacerbated in the presence of incentives that align executives' interests with those of shareholders. Results indicate that subprime securitizers distributed more dividends than other financial institutions before the beginning of the crisis while they did not reduced dividend distribution on the immediately subsequent period. Overall, results presented are in line with the idea that the securitization of risky loans has allowed banks and shareholders to pursue their private interest while accumulating and hiding risks that ex-post have been paid by the whole system.

3.6 Conclusions

In this paper we empirically investigate the role of CEO's equity and risk-related incentives in boosting securitization activities and in transferring risk to outside investor through the securitization of risky loans.

Using a sample of US financial institution over the period 2003-2009, we document that CEOs with high equity incentives systematically engaged in securitization transactions to a larger extent than CEOs with low equity incentives. We also show that CEO's with high equity and risk-related incentives engaged more in *risky* securitization activities than CEOs with low incentives and transferred risk to outside investors by moving off-balance the riskiest loans. Moreover, we

show that executives incentivized on risk provided outside investors with a low quality disclosure about losses recorded on loans that were securitized thus contributing to increase the opacity of transactions undertaken. We interpret these results as evidence that highly incentivized CEOs saw securitization as a useful tool to enhance banks' profits and stock price. Moreover, we argue that risk-incentivized executives saw in securitizations an opportunity to hide the risks generated while betting on them.

In additional analyses we document that subprime securitizers over-performed the peers before the market crash in 2007 while they underperformed other financial institutions once the subprime market collapsed. Moreover, subprime securitizers were able to distribute more dividends than the other financial institutions. Overall, our results speak to the role of equity and risk incentives in motivating CEOs to engage in securitization activities, and show that these widely used incentive tools had the consequences of boosting financial transactions that turned out to be extremely costly.

Our contribution, therefore, adds to the large stream of research warning about possible side effects of equity compensation and uncovers a determinant of securitization transactions that has been overlooked by previous literature.

APPENDIX 3. A

Estimates of a stock option's sensitivity to stock price are calculated based on the Black-Scholes (1973) formula for valuing European call options, as modified to account for dividend payout by Merton (1973).

$$Option\ Value = [S\, e^{-dT} N(Z) - Xe^{-rT} N(Z-\sigma T^{(1/2)}]$$

Where

$Z = [\ln(S/X) + T\,(r - d + \sigma^2/2]/\sigma T^{(1/2)}$

N = cumulative probability function for the normal distribution

S = price of the underlying stock

X = exercise price of the option

σ = expected stock-return volatility over the life of the option

r = risk-free interest rate

d = expected dividend yield over the life of the option

The sensitivity with respect to a 1% change in stock price is defined as:

$$[\delta(option\ value)/\ \delta(price)*(price/100) = e^{-dT} * N(Z) * (price/100)$$

The sensitivity with respect to a 0.01 change in stock price volatility is defined as:

$$[\delta(\text{option value})/\ \delta(\text{volatility})]*0.01 = e^{-dT} * N'(Z) * ST^{1/2}*0.01$$

where N' is the normal density function.

APPENDIX 3. B

Variable	Definition
Securitization	Total amount of financial assets that have been transfered off-balance through securitization, divided by the amount of total loans managed
Loss Secur	Percentage loss on securitized loans
Diff in Losses	Difference between the percentage credit loss on securitized loans and the percentage of credit loss on withheld loans
Equity Incentives	Logarithm of the dollar change in the value of CEO's stock and option holdings that would come from a one percentage point increase in the company stock price
Risk Incentives	Vega of CEO's stock options divided by their Delta
Log Age	Log transformation of CEO's age
B_M	Book value of equity divided by its market value
Returns	Market annual returns
Size	Logarithm of total assets
Change Assets	Percentage change in total assets with respect to the previous year
Change Tier 1	Percentage change in Tier 1 with respect to the previous year
Interest Income	Net interest income standardized by total revenues
GDP	Gross Domestic Product
Top Subprime	Dummy equal to one if the financial institution is listed as top subprime securitizer in the Mortgage Market Statistical Annual during the period 2000-2007
Disclosure Index	4-point-scale variable that classifies the quality of information provided by the financial institution about the amount of losses recorded on securitized loans

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