Essays on the Determinant and Consequence of Tournament Incentives: Evidence from China

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Essays on the Determinant and Consequence of Tournament Incentives: Evidence from China

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ABSTRACT

This research investigates the determinant and consequence of tournament incentives using data of publicly listed Chinese firms. Understanding the role of the tournament incentive and its implications is crucial, since it affects firms' profitability and, consequently, shareholders' wealth. Furthermore, whether tournament incentives function as an effective governance tools has remained under-explored in emerging markets. Our study sheds new light on the use of tournament incentives in the Chinese market. This study is organized into three essays: (i) a survey of the existing literature on tournament incentives in the accounting and finance area; (ii) the relation between business strategy and tournament incentives; and, finally, (iii) the effect of tournament incentives on stock price crash risk.

Essay One synthesizes the theoretical underpinnings of tournament models, reviews the extant empirical literature on the determinants and consequences of tournament incentives, critiques the findings, and offers suggestions for future research. We synthesize findings from 63 empirical papers and find that several firm-level fundamental and corporate governance variables affect the structure of corporate tournaments. Our review of the consequences of tournament structure reveals that tournaments affect financial reporting and auditing as well as firm-level operational and capital market-based outcomes. This review reveals that the existing accounting and finance literature lacks a strong justification for why one theory, rather than another, is favoured. Moreover, based on potential problems that may exist in empirical models, this review also offers some methodological implications for empirical tournament studies.

In Essay Two, we investigate the association between business strategy and firm-level tournament incentives in China, and find that business strategy is positively associated with firm-level tournament incentives, as proxied by pay differences among senior executives. We

further explore the association between tournament incentives and future firm performance, conditional on various business strategies. We find some evidence that the larger tournament incentives offered by firms following innovative strategies are associated with better operating performance. We also find that the positive relationship between business strategy and tournament incentives is manifested only for local, but not central, state-owned enterprises (SOEs). However, no differential evidence is found using firm performance analysis. Our study fills a gap in the existing tournament literature by incorporating business strategy as a critical determinant of the tournament incentives in the more cash-compensation setting of China.

Finally, in Essay Three, we investigate the association between tournament incentives and firms' stock price crash risk in China. We explore the Chinese setting, where a cash-based compensation system is the primary compensation scheme, as opposed to the equity-based incentive schemes commonly found in the U.S. We provide robust evidence that promotion-based tournament incentives, proxied by compensation differences among top executives, are negatively and significantly associated with firms' stock price crash risk. We also find that conditional conservatism mediates the negative association between tournament incentives and price crash. Finally, we find that the negative relationship between tournament incentives and price crash is significant for the non-state-owned enterprises only. The findings advance our understanding regarding the corporate governance role of tournament incentives in protecting shareholders' wealth, since the occurrence of stock price crash risk destroys shareholder value.

Key Words: Tournament incentives, Business strategies, Stock price crash risk, Financial reporting quality, China

“Nothing is difficult if you put your heart into it.”

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"It's not the mountain we conquer, but ourselves." - Sir Edmund Hillary

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LIST OF ABBREVIATIONS

China's Listed Company Governance Index (CCGINK)

China Securities Regulatory Commission (CSRC)

Gulf Cooperation Council countries (GCC countries)

Ministry of Finance (MOF)

National Audit Office (NAO)

State Asset Management Bureaus (SAMBs)

Sate-Owned Enterprises (SOEs)

SOEs Affiliated to the Central Government (SOECGs)

SOEs Affiliated to the Local Government (SOELGs)

State-owned Assets Supervision and Administration Commission (SASAC)

CHAPTER ONE - INTRODUCTION

1.1 Motivations for the research

Existing literature has strongly advocated for an optimal compensation system design, to alleviate many of the agency problems faced by corporations (Brown & Caylor, 2009; Conyon, 2006). Although many different theories can be, and are, used to explain executive compensation, the field is still dominated by the optimal contracting approach of agency theory espoused by Jensen and Meckling (1976). They hold the view that a properly designed executive pay structure is instrumental in alleviating agency problems, and that executives should be rewarded for risks they are willing to bear in the best interests of the company's shareholders. To date, the majority of research takes this perspective, but the evidence remains mixed. One possible reason for such mixed findings could relate to managerial power, whereby powerful CEOs can influence firm decision-making to maximize their own benefits. Such an arrangement exacerbates the agency problem by inducing managerial rent-seeking (Bertrand & Mullainathan, 2001; Healy, 1985; Yermack, 1997).

The evaluation criterion of optimal compensation depends mainly on what has been set out in the performance targets, hence, executive compensation incorporating the features of 'optimal contracting' and 'managerial power', may be less effective in maximizing shareholder value. Therefore, an alternative form of compensation, the rank-order tournament proposed by Lazear and Rosen (1981), has attracted increasing attention from researchers. Tournament incentives are structured as a contest between senior executives, whereby, only the best relative performer will win the contest and receive generous remuneration, perks, and privileges (Bognanno, 2001; Eriksson, 1999; Lazear & Rosen, 1981; Murphy, 1999).

Tournament incentives could exist for two fundamental reasons. First, previous studies confirm that most of the variation in pay occurs between levels, rather than within jobs (Lazear, 1995). The theory of absolute performance measurement, based on contracting theory, is unlikely to explain this pay differential. Second, tournament theory states that, as monitoring difficulties increase, a large pay gap between the CEO and the senior executives reduces the need for costly supervision, and better aligns principal-agent interests by altering the nature of executive risk-taking, among other advantages (Lazear & Rosen, 1981). Using rankings is substantially easy and cheap as a way to measure an agent's performance (Green & Stokey, 1983; Knoeber, 1989). Furthermore, ambiguity in the distribution of an agent's output levels, makes it difficult for principals to evaluate the agent's efforts objectively. Therefore, principals are more likely to establish a tournament-based compensation practice, since this allows only the *rank* of an agent's output distribution to be observed, but not the *level* (Kellner, 2015).

Given the importance of tournament incentives in the real world, academic researchers, too, have started to examine the 'determinants' and 'consequences' of tournament incentives in the recent decade. In Essay One, we review the burgeoning empirical literature on the determinants and consequences of tournament incentives in the domains of accounting and finance, since it has implications for firm performance, financial reporting quality and capital markets. Competing arguments exist regarding the consequences of tournament incentives. On one hand, tournament incentives could both encourage non-CEO executives to exert more effort towards promotion and constrain managerial opportunistic behaviours, resulting therefore, in better firm performance (Coles et al., 2017; Kale et al., 2009; Lee et al., 2008; Lin & Lu, 2009; Zhang et al., 2018). On the other hand, since managers may inflate their own performance to maximize promotion probability, tournament incentives can also be a mechanism for aggressive and competitive behaviours, such as earnings manipulation (Park,

2017), and excessive risk-taking (Kini & Williams, 2012), which would further exacerbate information asymmetry and, consequently, destroy shareholders' wealth.

Given that institutional differences, e.g., cultural, economic, political and legal differences, have a great impact on tournament mechanisms (Burns et al., 2017), it is far from clear whether the U.S. evidence on tournament incentives is equally applicable in other countries, especially emerging markets. For example, listed firms in the Asia region have different institutional arrangements compared to their Western counterparts, such as a high proportion of family and/or state ownership, as well as a cash-dominated compensation structure as opposed to an equity-based one. Considering the above mentioned issue, it is valuable to further address the question of whether tournament incentives are an effective internal governance tool and, particularly, whether studying the Chinese market advances our understanding of the influence of country-specific distinctive features on the determinants and consequences of tournament incentives.

Surprisingly, fewer empirical studies have explored the potential determinants of tournament incentives as compared to the consequences of such incentives. In Essay One, we reviewed 63 papers in total, of which 8 explored the determinants of tournament incentives, whereas 55 papers investigated their consequences. So far, prior studies evidence that firm-level fundamental factors, such as firm size (Kale et al., 2009), firm growth pattern (Sahib et al., 2018), CEO personal traits (Vitanova, 2018); firm-level basic governance factors, such as state ownership (Kato & Long, 2011) and board affiliation (Chen et al., 2014); and, finally, cultural values, including power distance and pay equity (Burns et al., 2017); affect the level and structure of corporate tournaments. However, other potential determinants remain under-explored. For example, to the best of our knowledge, no study has yet investigated whether business strategy has an impact on tournament incentives, which is rather surprising, given the

dominant role business strategies play in shaping corporate decisions. Therefore, in Essay Two, we explore how business strategy affects tournament incentives.

In the recent decade, a plethora of studies has examined the consequences of tournament incentives. For instance, studies find that tournament incentives have an impact on financial reporting quality (Park, 2017; Zhang et al., 2018), firm innovation (Jia et al., 2016; Siegel & Hambrick, 2005), firm performance (e.g., Kale et al., 2009; Lin & Lu, 2009), tax avoidance (Kubick & Masli, 2016), audit fee (Bryan & Mason, 2017; Jia, 2017), firm risk-taking (Kini & Williams, 2012), cost of capital (Chen et al., 2013), firm liquidity (Huang et al., 2019) and firm acquisitiveness and acquisition risk (Nguyen et al., 2017). In Essay Three we examine the effect of tournament incentives on stock price crash risk.

1.2 The Institutional context of the research

Relatively little is known about executive compensation and ownership structure in China as compared with developed markets (Firth et al., 2006, Kato & Long, 2006). Sun et al. (2010) review the executive compensation literature in Asia and suggest that performance criteria (earning-based performance) and ownership structure (state ownership), are two important factors that have profound implications for differences in executive compensation in China versus the U.S. In this section, we offer a brief overview of the institutional context of China and how it affects our empirical studies on the determinants and consequences of tournament incentives.

1.2.1 Executive compensation in China

Unlike listed companies in the U.S., where equity-based compensation has been used extensively for a long time, most Chinese companies compensate their top management using

cash-based compensation. From a regulatory perspective, managerial compensation disclosure differs between China and the U.S. The China Securities Regulatory Commission (CSRC) regulates the information disclosure of listed firms, including the disclosures of executive remuneration. The earliest practice of such voluntary disclosures was found in the early 1990s, but there was no mandatory requirement for listed firms to provide complete executive compensation information in their annual reports until 2000 (CSRC, 1998). However, from 2001, all publicly traded companies were required to disclose the sum of total remuneration for the three highest-paid management and the three highest-paid board members (including executive board members). Moreover, during the period from 2005 to 2007, listed firms were required to reveal the remuneration of each individual top manager and board member in total and in detail, as the sum of basic salary, bonus, stipends, and other benefits (CSRC, 2005a, 2007).

Since executives in Chinese publicly traded firms receive mainly cash compensation, they are rewarded typically based on earnings, rather than on stock-based performance (Conyon & He, 2016; Cordeiro et al., 2016; Li et al., 2013; Xiao et al., 2013). In 2005, the CSRC issued the "Methods of Listed Companies' Stock Incentive" (stock options) that came into effect at the beginning of 2006 (CSRC, 2005b). This *Methods* stipulated the fundamental requirements, implementation procedures and information disclosure for publicly traded firms, regarding the implementation of equity incentive plans. Given the Chinese stock market was still in its initial stages of development, the regulation allowed only a few listed firms to grant stock options, or restricted stocks, to their top executives (CSRC, 2005b). Therefore, both the coverage and the percentage of stock-based compensation to total compensation, has been rather insignificant for the Chinese listed firms. However, beginning from 2015 and onward, there has been a gradual increase in the use of equity-based incentives schemes, following revisions of the CSRC regulation.

1.2.2 Ownership of publicly traded firms in China

During the process of transition from a centrally-planned to a market-oriented economy, state-owned enterprise (SOE) reform has become a major component of the economic transformation in China. The Chinese government considers mainly the balance between the commercial and political objectives of its SOEs. Under the centrally-planned market system, SOEs were responsible for the welfare, health, and education of their staff. Top management was hired and fired by officials of the Communist Party, who were in charge of overseeing the SOEs (Kang & Kim, 2012). However, unclear property rights between the government and enterprises, and laggard corporate management systems, made SOEs less innovative and productive compared with their non-SOE counterparts. This led to the realization that SOEs should be more market-oriented to promote firm productivity in the long run. The SOE reforms have gone through several stages over the last 40 years in China. As a result, the number of registered SOEs decreased by nearly 50% during the period from 1997 to 2001(Kang & Kim, 2012).

In recent decades, the major reforms of SOEs have enabled such firms to better integrate into the market economy system and to improve their corporate effectiveness and efficiency constantly, in order to respond to intense competition from private companies and multinational companies. However, it is still evident that state ownership has a great influence on the level and structure of executive compensation. Apart from regular compensation benefits, executives in SOEs also enjoy life-long political perks, which are an important component of their total compensation. These consist of high levels of pension, substantial housing subsidies, fully subsidized medical treatment, and job security. Such political perks are closely related to the executive's political position (Chen et al., 2011; Kato & Long, 2006).

Besides, in the recent decade, the managerial compensation for executives in the SOEs has been subject to a "pay cap" policy: a policy that reduced the pay gap between SOE

executives and SOE employees from a ratio of 12:1 to 7:1 or 8:1 (Zhang et al., 2018). This has further increased SOE executives' desire for positional salaries. Although prior literature supports a positive relationship between executive compensation and firm performance in China (Firth et al., 2006; Kato and Long, 2006; Buck et al., 2008), the literature also reveals that this positive association is weakened by significant government influence (e.g., Choe & Yin, 2000; Kato & Long, 2006).

According to the CSRC official share classification, shares are categorized into domestic (A shares) or foreign (B, H, and N shares) on the basis of the residency of their owners. More specifically, tradable A-shares are held by domestic citizens or Chinese institutions, while tradable B and H shares are traded on the Shenzhen/ Shanghai Exchange and the Hong Kong Exchange, separately (Kang & Kim, 2012). In our studies, we focus mainly on the domestic tradable A-share market. Domestic A shares are further categorized into individual shares (tradable shares), legal person shares and state shares. State shares are held by the central government, local governments, state assets investment bureaus, state assets management bureaus, or by wholly government-owned enterprises (Kang & Kim, 2012). As a result, SOEs can be further classified into "central SOEs", controlled by the central government, and "local SOEs", controlled by the local government. The deepening of fiscal decentralization and market liberalization allows local SOEs to obtain market orientation and managerial autonomy, which has further prompted them to diversify their business priorities (Li et al., 2018). Compared with local SOEs, which follow more relaxed investment approval procedures, central SOEs have undergone increasing consolidation, turning them into national policy instruments for sustaining macro-level growth and national industrial policies.

Taken together, the institutional environment elaborated above, enables us to explore whether tournament incentives could act as a suitable corporate governance mechanism in China. Since different cultural and political environments largely influence the effectiveness

of tournament incentives, the investigation of tournament incentive practices in China could provide important insights for other markets as well.

1.3 Overview of the three essays

Essay One provides a comprehensive review of the burgeoning empirical literature on the determinants and consequences of tournament incentives in the domains of accounting and finance, since it has implications for firm performance, financial reporting quality and capital markets in the recent decade. Although the first theoretical paper was written by Lazear and Rosen in early 1980s, Kale et al. (2009) wrote the first empirical paper to measure tournament incentives using pay gap published in an accounting and finance journal. We review a total of 63 papers from 2009 to 2019, of which 8 investigated the determinants of tournament incentives, and 55 explored their consequences. Our review reveals that a number of firm-level fundamentals, such as firm size and firm growth pattern, and corporate governance variables, like board affiliation and CEO duality, affect the level and structure of corporate tournaments. Research also finds that cultural values, such as power distance and pay equity; also influence the size of the tournament prizes. With respect to the consequences of tournament incentives, we first review literature on the effect of tournament incentives on financial reporting quality and audit response and report mixed evidence. This review also reveals that tournament incentives improve firm performance, boost firm innovation, encourage more risk-taking and increase tax avoidance, as well as increasing executive turnover and the probability of lawsuits. Moreover, we also review the empirical studies examining the effects of tournament incentives on capital market consequences, e.g., stock liquidity, cost of capital, and firm-level price crash risk. Our review identifies the Asia region and the Gulf Cooperation Council (GCC) countries as an underexplored institutional setting for tournament research. So far, most of the tournament studies have focused on the U.S. market. However, the question of whether

tournament incentives function similarly in other countries, for example, in those in the Asia countries, is far from clear as countries in the Asia region and the U.S. have significant differences in terms of cultural orientation with respect to compensation arrangements. We, therefore, offer some potential avenues for tournament research for firms in these regions. Besides, we have highlighted that existing studies suffer from measurement problems linked with how best to capture the tournament setting. Hence, future researchers could endeavour to devise a better measure, that separates clearly tournament from pay gap research.

Essay Two explores the role of corporate business strategy in shaping tournament incentive structures in China during the period from 2011 to 2017. Specifically, we examine whether firms pursuing a prospector strategy have larger tournament sizes compared with defender-type firms. Prospectors (innovation-oriented strategy) concentrate mainly on seeking new products and identifying potential market opportunities. Therefore, they invest substantially in R&D and marketing projects. In order to respond to changes in market conditions quickly, prospectors prefer to maintain a more flexible organizational structure, and to offer greater managerial discretion for coping with uncertainties. In contrast, defenders focus on how to acquire a competitive advantage on their products, service and quantity, through more efficient production and distribution in a single market. Hence, to gain the competitive advantage through lower control operating costs, defenders pursue a more centralized organizational structure (Miles & Snow, 1978; Thomas & Ramaswamy, 1996). Analysers, the remaining strategy group, exhibit characteristics of both prospectors and defenders.

We predict a positive relationship between business strategy and the adoption of tournament incentives because, as mentioned above, prospector-type firms that focus on seeking new growth opportunities and rapid changes in product markets, operate businesses under an intensively competitive environment. Such challenges encourage them to expand their top management team. As more executives join in, leading to a larger internal candidate pool,

prospectors are likely to enlarge the tournament prize to compensate for the lower probability of promotion to the CEO position (Holmstrom, 1992; Lazear & Rosen, 1981; McLaughlin, 1988;). In contrast, defender-type firms that concentrate on production efficiency and cost control, implement strict guidelines on investment approval to reduce risk-taking. Hence, executives in such firms enjoy less managerial discretion. Defenders, therefore, are unlikely to adopt tournament incentives to compensate executives. Our baseline results support our assumption.

We then explore whether tournament incentives could moderate the relationship between business strategy and firm performance. Compared to defender-type firms, prospector-type firms are more likely to generate high potential profits, as they invest intensively in R&D activities (Bentley et al., 2013; Miles & Snow, 1978, 2003). However, the uncertain and long payback nature of R&D investments may sometimes cause them to underperform their counterparts. We posit that the use of tournament incentives could help prospector-type firms encourage their executives to obtain the firm-specific skills needed to manage risky investments effectively, thereby, enhancing the firm value. However, others argue that tournament incentives could hamper firm performance, because of relative deprivation and political sabotage: adverse outcomes that decrease cooperation and organizational commitment (Henderson & Fredrickson, 2001). We provide some evidence that innovative firms offering larger tournament prizes to their executives, tend to have better future performances. Our results further suggest that the positive relationship between business strategy and tournament incentives is confined to non-SOEs and local SOEs. Our study makes an incremental contribution to the existing tournament literature by providing new evidence on the importance of business strategies in determining cash-based tournament incentives in China. The findings also have policy implications for regulators regarding the appropriate design of managerial compensation for SOEs. Our empirical evidence suggests that only the local SOEs'

tournament incentives are sensitive to business strategy, hence, "Pay Cap" policy may be more appropriate for central SOEs, since these firms are less innovative, and do not necessarily need a large compensation gap to compensate their executives.

Essay Three investigates the implication of tournament incentives for the potential occurrence of firm-level stock price crash risk in the Chinese market. Tournament incentives, as an implicit internal monitoring mechanism, could discourage executive misbehaviour and, therefore, result in the delivery of higher quality financial reporting, thus, lowering the occurrence of price crash. This is because opaque financial reporting to conceal bad news has been suggested to be the primary driver of the price crash. When the accumulated bad news is released to the market, it can result in a sharp decline in stock prices (Hutton et al., 2009; Jin & Myers, 2006). However, others argue that tournament incentives will aggravate the price crash, because executives can increase their chance of promotion by manipulating the reported earnings (Bryan & Mason, 2017; Park, 2017). Moreover, they are also more likely to take risky projects to boost firm performance. Such aggressive behaviour increases the risk of price crash, since it exacerbates information asymmetry, particularly when corporate performance is not as good as expected, because managers consider this bad news as temporary and, thus, conceal it. Therefore, the effect of tournament incentives on price crash is an empirical question.

By using a large group of Chinese listed firms in the A-share market during the period from 2007 to 2016, our results support the argument that tournament incentives constrain the occurrence of stock price crash risk. We further explore the potential mediating effect of financial reporting quality on this association by adopting three common proxies of reporting quality (discretionary accruals, real earnings management and conditional conservatism). Our results provide partial evidence on the mediating effect of financial reporting quality, and report that tournament incentives increase conditional conservatism, which then decreases the likelihood of price crash. In addition, we also look at the moderating effect of state ownership

on the association between tournament incentives and price crash and provide evidence that the constraining effect of tournament incentives is confined to non-SOE observations only. The main findings continue to hold after a series of robustness tests. Our findings contrast with Jia (2018a), who reports that tournament incentives increase price crash, using data from the U.S. Also, the mediating effect of conditional conservatism documented in this study fills a gap in the existing literature relating crash risk to managerial incentives, as previous studies have not conducted tests to isolate the direct and indirect effects of tournament incentives. Last but not least, this research also enriches the executive compensation literature by concentrating on the top management team, instead of on CEOs alone, as pay disparity research has received far less attention than CEO compensation research, particularly in the emerging markets.

1.4 Organization of the research/overview of the three studies

The remainder of the thesis proceeds as follows. Essay One is titled: "Determinants and consequences of tournament incentives: A survey of the literature in accounting and finance"; Essay Two is titled: "Business strategy, tournament incentives and firm performance: Evidence from China"; and Essay Three is titled: "Tournament incentives and stock price crash risk: Evidence from China". Chapter five concludes the thesis.

CHAPTER TWO - DETERMINANTS AND CONSEQUENCES OF TOURNAMENT INCENTIVES: A SURVEY OF THE LITERATURE IN ACCOUNTING AND FINANCE (ESSAY ONE)

2.1 Introduction

Existing literature has strongly advocated for an optimal compensation system design, to alleviate many of the agency problems faced by corporations (Brown & Caylor, 2009; Conyon, 2006). Although many different theories, for instance, managerial power theory, stewardship theory, marginal productivity theory or social comparison theory can, and are, used to explain executive compensation, the field is still dominated by the optimal contracting approach of agency theory espoused by Jensen and Meckling (1976). They hold the view that a properly-designed executive pay structure is instrumental in alleviating agency problems, and that executives should be rewarded for risks they are willing to bear in the best interests of the company's shareholders (Jensen & Meckling, 1976; Jensen & Murphy, 1990). Accordingly, this optimal contracting approach posits a positive association between executive compensation and firm performance (Barkema & Gomez-Mejia, 1998; Dong et al., 2010; Gomez-Mejia, 1994; Upneja & Ozdemir, 2014). However, empirical evidence has provided mixed results, with some documenting the expected positive relationship (Aggarwal & Samwick, 2006; Conyon & He, 2011; Kato & Long, 2006); whilst some others do not (Brick et al., 2006; Duffhues & Kabir, 2008; Fernandes, 2008). For example, pay-for-performance sensitivity is found to be very low in the UK (Buck et al., 2003; Conyon & Murphy, 2000); Germany (Haid & Yurtoglu, 2006); Canada (Zhou, 2000); China (Firth et al., 2006); and Portugal (Fernandes, 2008).

One of the possible explanations for the mixed evidence could relate to managerial power, in that powerful CEOs can influence firm decision-making to maximize their own benefits. According to managerial power theory (Finkelstein & Hambrick, 1989), boards often do not serve as faithful agents of shareholders. It contends that managers induce directors to adopt compensation arrangements that are less reliant on firm performance.[1] Managerial power theory suggests that when managerial power becomes stronger, executive compensation structures become less effective in disciplining managerial wrongdoings: an outcome that adversely affects firm performance. Such an arrangement exacerbates the agency problem by inducing managerial rent-seeking (Bertrand & Mullainathan, 2001; Healy, 1985; Yermack, 1997).

The hallmark of the explicit/optimal compensation is that the evaluation criterion depends mainly on managerial absolute output: proper verification of which is very costly, since it is not possible to contract *ex-ante* for many unforeseen managerial actions. Therefore, in cases of less-than-perfect monitoring, executives are more likely to shirk their responsibilities (Lazear & Rosen, 1981). As a result, managers will try to achieve only what has been set out in the performance targets. Hence, executive compensation incorporating the features of 'optimal contracting' and 'managerial power', may be less effective in maximizing shareholder value. Therefore, an alternative type of compensation structure, *the rank-order tournament*, is also used by corporations (Lazear & Rosen, 1981). Tournament incentives are structured as a contest between senior executives, whereby, only the best relative performer will win the contest and receive generous remuneration, perks, and privileges (Bognanno, 2001; Eriksson, 1999; Lazear & Rosen, 1981; Murphy, 1999).

[1] Executives can have substantial influence over their own pay (Bebchuk & Fried, 2003) and, hence, it is not surprising to find that powerful managers have weak pay-for-performance sensitivity, as it is possible for them to be paid for 'luck' (Bertrand & Mullainathan, 2001). CEOs can manipulate director appointments to bias board decisions that can help the CEOs facilitate rent extraction (Gomez-Mejia et al., 1987). Also, directors can award excessive pay to CEOs, with an expectation that CEOs will support their cause as well (Core et al., 1999; Morse et al., 2011).

The purpose of this essay is to synthesize the burgeoning empirical literature on the determinants and consequences of tournament incentives in the accounting and finance area. The literature defines tournament incentives as a contest between senior executives, whereby, only the best relative performer will win the contest and receive generous remuneration, perks, and privileges (Bognanno, 2001; Eriksson, 1999; Lazear & Rosen, 1981; Murphy, 1999). Prendergast (1999, pp. 34-36) suggests that, "…all that matters for winning is not the absolute level of performance but how one does relative to others . . . to a large extent firms primarily provide incentives through the prospect of promotion, where higher wages can only be attained through changing ranks."

Tournament incentives could exist for two fundamental reasons. First, previous studies confirm that most of the variation in pay occurs between levels, rather than within jobs (Lazear, 1995). For example, the payment of top executives often triples soon after their promotion to the CEO position.[2] The theory of absolute performance measurement, based on contracting theory, is unlikely to explain this surge in wealth. Second, tournament theory states that, as monitoring difficulties increase, a large pay gap between the CEO and the senior executives reduces the need for costly supervision, and better aligns principal-agent interests by altering the nature of executive risk-taking, among others (Lazear & Rosen, 1981). As for principals, they pursue the cheapest way to monitor and evaluate agents' actions. Using rankings is substantially easy and cheap as a way to measure an agent's performance (Green & Stokey, 1983; Knoeber, 1989). Furthermore, ambiguity in the distribution of an agent's output levels, makes it difficult for principals to evaluate the agent's efforts objectively. Therefore, principals are more likely to establish a tournament-based compensation practice, since this allows only the *rank* of an agent's output distribution to be observed, but not the *level* (Kellner, 2015).

[2] For example, the key executives (vice presidents) in JPMorgan Chase & Co, receive average pay increases of 45.78% if one of them get promoted to the CEO position, whereas their pay increase through continued service in a given position amounted to 11.58% for the year 2015-2016 (manually collected from JPMorgan Chase & Co annual reports).

Bloom and Michel (2002) find that the tournament incentive is an effective tool to help a principal evaluate the performance of an agent, especially when the environment is uncertain, and information asymmetry is acute.

Given the importance of tournament incentives in the real world, academic researchers, too, have started to examine the 'determinants' and 'consequences' of tournament incentives. Connelly et al. (2014) provide a comprehensive review of tournament incentives as used in the management area. We review the determinants and consequences of tournament incentives in the domain of accounting and finance, since tournament incentives have implications for firm performance, financial reporting quality and capital markets. We choose a systematic review rather than a structured literature review. The advantage of systematic reviews lies in a ''replicable, scientific, and transparent process that enables the researcher to provide an audit trail, justifying his/her conclusions" (Tranfield et al., 2003, p. 218). We also offer potential research opportunities for both the determinants and the consequences of the tournament incentives.

To ensure the quality of our reviewed papers, we purposely included *empirical* papers on the determinants and consequences of tournament incentives published from 2009 to 2019 in journals that are ranked B and above by the Australian Business Dean Council (ABDC) 2019 Journal Rankings.[3] The first theoretical paper was written by Lazear and Rosen (1981). Kale et al. (2009) wrote the first empirical paper to measure tournament incentives using pay gap published in an accounting and finance journal. We also included 14 working papers in our review. Working papers pose a challenge because of their sheer number, and because they have

[3] We found a high degree of overlap in the journal rankings in the accounting and finance field in the ABDC and the Association of Business Schools (ABS) Journal rankings. ABDC tends to be a more inclusive list and we decided to follow the ABDC ranking (ABDC, 2019; ABS, 2018). For a complete list of journals of ABDC and ABS ranking systems, please see ABDC 2019 Journal Rankings, retrieved from https://abdc.edu.au/research/abdc-journal-list/2019-review/ and ABS 2018 Journal Rankings, retrieved from https://charteredabs.org/academic-journal-guide-2018/

not undergone peer review. We choose a subset of papers that have been presented at top conferences (Harvey et al., 2016) and have received some citations. We conducted a keyword search containing 'tournament incentives', 'pay gap', 'pay disparity', 'compensation gap' and 'compensation disparity'[4] in databases like EBSCOhost, Emerald Insight, Scopus, Web of Science, Google Scholar and Social Science Research Network (SSRN). According to prior literature, tournament incentives can be captured by the pay difference between the CEO and the remaining senior executives (Carpenter & Sanders, 2002), between senior executives and other employees (Wade et al., 2006) and among employees at various levels within a firm (Cowherd & Levine, 1992) or within industries. Hence, our review includes studies that used any one of these tournament constructs.[5] Collectively, a total of 63 papers were identified, of which 8 investigated the determinants of tournament incentives, whereas 55 papers explored the consequences of tournament incentives. Forty-one of the papers were published in A* and A-ranked journals; whilst only seven were published in B -ranked journals. One published paper is sourced from a journal not ranked in the current ABDC journal ranking list (Cooper et al., 2014). We included a total of 14 working papers in our review. To make this review comprehensive, we included papers that explored the determinants and consequences of tournament incentives from an accounting and finance angle, but were published in journals of other disciplines, such as management and economics (e.g. *Corporate Governance*: *An International Review*).

[4] Initially, we search tournament papers by using these key words, since they are commonly used as alternative words to represent tournament incentives in the existing studies. Then we read carefully and included only papers that capture tournament incentives, rather than others, like CEO power. Moreover, we also include papers that examine the determinants and consequences of pay gap by testing different perspectives, such as tournament, CEO entrenchment or social comparison on pay gap, while supporting the tournament incentives argument. Besides, although current measurement fails to capture tournament incentives appropriately, our review reveals a lack of awareness by researchers of the need to control for the confounding effect of CEO power. Please see section 2.5.3 for an elaborated discussion on this point.

[5] Research on CEO Pay Slice (CPS) indicating how *central* the CEO is within the top executive team has also used the pay gap between the CEO and the remaining top executives (Bebchuk et al., 2011). The large pay gap between CEO and the remaining executive members gives an indication of CEO power (Lambert et al., 1993). However, we did not include such papers in this review because CPS does not reflect the promotion incentives feature of tournament theory.

Our review is different from prior reviews on absolute performance-based compensation plans, especially CEO compensation, such as Murphy (1999), Devers et al. (2007) and Faulkender et al. (2010). First, we focus on the executive-team, instead of on the CEOs alone. Although senior executives play a critical role in firm-level operational decision-making, previous reviews focused mainly on how to design an effective incentive plan for CEOs. Second, our review enriches the executive compensation literature by synthesizing research on 'tournament incentives' that considers the interplay among senior executives. As mentioned before, absolute performance-based compensation incentives may exacerbate agency problems. The question of whether a tournament-based compensation arrangement can alleviate such problems, has received significant research focus. Our review, therefore, is a timely contribution to the debate surrounding optimum compensation plans for firms. Third, and different from other reviews, our synthesis of the existing tournament incentive studies identifies the *Asia region* as an underexplored institutional setting for tournament research. As will be apparent from our review, the vast majority of tournament-based studies have been conducted in the developed countries (mainly the U.S.). However, listed firms in the Asia region have different institutional arrangements compared to their Western counterparts, for example, a high proportion of family and state ownership, and a cash-dominated compensation structure as oppose to an equity-based one. We, therefore, offer some potential avenues for tournament research for firms in this region.

This review is useful for researchers willing to conduct future research on the determinants and consequences of tournament incentives, particularly in Asia region, which differs significantly in terms of cultural orientation with respect to compensation arrangements. Most of the tournament studies have focused on the U.S. market. However, the question of whether tournament incentives function similarly in other countries, particularly, in those in the Asia region, is far from clear. Moreover, we have highlighted that existing research suffers from measurement problems associated with how best to capture the tournament setting. Hence,

future researchers could endeavour to devise a better measure, that separates clearly tournament from pay gap research. Our review suggests that, at the least, authors(s) should control for CEO power in testing for the consequences of tournament incentives. Moreover, we highlight some of the factors that boards of directors need to consider in setting tournament incentives that will motivate executives to work hard for the maximization of firm performance. For example, an inappropriately designed tournament contest may encourage executives to take on projects with excessive risk and, then, engage in earnings manipulation to conceal bad news stemming from failed projects.

The essay proceeds as follows. In the following section, we provide a theoretical overview of the fundamentals of tournament models. In Section 2.3, we synthesize the literature on the determinants of tournament incentives. We categorize the determinants into two groups: (i) firm-level characteristics, and (ii) culture and institutional characteristics. In Section 2.4, we discuss the empirical research into the consequences of tournament incentives, grouping them into (i) financial reporting and auditing; (ii) firm-level operational; and (iii) capital market. Section 2.5 discusses future research opportunities on tournament incentives in the Asia region and also offers some methodological suggestions to improve the validity of the existing findings. The final section concludes the essay.

2.2 The fundamentals of tournament models

The evolution of tournament theory can be dated back to the 1980s and 90s and to several labour economists (e.g., Ehrenberg & Bognanno, 1990; Green & Stokey, 1983; Knoeber & Thurman, 1994; Lazear & Rosen, 1981; Nalebuff & Stiglize, 1983; Rosen, 1986). Tournaments arise because they help principals to encourage all executives to work hard and reward the most able managers. The basic idea that emanated from these papers was that a large pay difference among different ranks will effectively encourage employees to exert more

effort, since each of them has the opportunity to get promoted to a higher rank. At the end of the contest, only the best performer among all contestants will get the most substantial financial/non-financial rewards, and he or she will be promoted to a superior position within the company.

2.2.1 Two-player tournament model

The tournament model of Lazear and Rosen (1981) demonstrates the two most foundational predictions of tournament theory. The *first* basic proposition is that the level of effort that executives exert increases with the prize to be spread between the winner and the loser. This testable prediction has received strong empirical support over the years (e.g., Bull et al., 1987). Meanwhile, Lazear and Rosen (1987) note that the productive output from the tournament is maximized only when the prize is "optimal", i.e., the efficiency of the tournament will be reduced if the pay gap is too large (Knoeber, 1989; Knoeber & Thurman, 1994; Lazear & Rosen, 1981). Although a large pay gap will encourage players to apply greater efforts, it will be unfair if other players, who also exert greater efforts, receive nothing: an outcome that will affect adversely their incentives for participating in the competition. The incentive effect of the tournament arrangements will also decrease if the pay gap is too small, since it cannot attract contestants to compete. The *second* prediction is that the prize differential between the winner and the loser, not the absolute level of the prize, determines the effort made by contestants (DeVaro, 2006a; Knoeber & Thurman, 1994). Some literature in the management field supports this idea (Brown et al., 2003; Cappelli & Cascio, 1991; Shaw et al., 2002).

Early empirical studies generally supported these predictions (e.g., Baker et al., 1988; Ehrenberg & Bognanno, 1990; Knoeber & Thurman, 1994; Lambert et al., 1993; Leonard, 1990; McLaughlin, 1988; Nalebuff & Stiglitz, 1983; O'Keeffe et al., 1984; Rosen, 1986). For

example, Ehrenberg and Bognanno (1990) demonstrate that performance in a golf tournament is better when the prize money is skewed towards relatively large prizes for the winner.

2.2.2 Extension of two-player model

The two-player tournament model originally espoused by Lazear and Rosen (1981) did not consider other possible conditions that might affect the effectiveness of the tournament model. Therefore, the scholars have extended this two-player model by incorporating multiple scenarios.

First, a simple but critical extension of the tournament theory involved incorporating more than two competitors (multiple competitors) to accommodate the fact that a pay gap incentive varies with the number of competitors (Green & Stokey, 1983; Main et al., 1993; O'Keeffe et al., 1984). Holding the prize spread fixed, the chances of winning a tournament decrease as more contestants join the tournament contest. As mentioned previously, only the optimal level of wage spread could maximize the productive output of the tournament. That implies that when more contestants join in, the prize spread becomes smaller than before and, hence, requires an increase in prize spread/differential as the number of competitors increases (McLaughlin, 1988).

Second, the adoption of a tournament needs to consider *actor heterogeneity*, as the likelihood of winning the prize is tied to any given executive's own willingness and ability to compete (Nippa, 2010). If some contestants are aware that their own abilities are inferior to those of their competitors, then they are likely to be demotivated (Knoeber & Thurman, 1994; Sunde, 2009). Tournament designers may consider *contestant heterogeneity* by forming sub-contests, in which participants compete with a more homogeneous subgroup (Gomez-Mejia et al., 2009) or by 'handicapping', which enhances the win possibility for disadvantaged participants (Pfeifer, 2011). In addition, Szymanski and Valletti (2005) also suggest that firms

should set up second prizes, where one contestant is very strong relative to the others, possibly to the point where the high-ability contestant also generates extra effort to mitigate pressure from relatively low-ability competitors.

Third, some researchers raise concerns about the simplifying presumption that competitors operate independently (Main et al., 1993). In reality, a top executive team must resolve interdependencies among different segments of the company collectively in an interdependent environment, such as a high-technology industry (Bloom, 1999; Siegel & Hambrick, 2005). When executive compensation is structured primarily on individual performance as compared to colleagues, aggressive competition among participants can result: an outcome that is costly for the firm. Although uncooperative behaviour diminishes the efficiency of tournament structures, Lazear (1998) suggests that reduction in prize differentials might attenuate uncooperative behaviour. Furthermore, Anabtawi (2005) suggests that a tournament could reduce dysfunctional behaviour in the event of aggressive competition, because tournaments enable firms to collect information regarding the suitability of an employee to the firm's culture.

Fourth, the tournament environment also plays a role in the design of prize spreads. According to the two-player model by Lazear and Rosen (1981), the optimum level of effort for a given prize differential increases with the random component. Indeed, the level of effort is a key factor for contestants, however, their probability of winning the tournament is also affected by irreducible random components, such as "luck" or "noise" (Eriksson, 1999). For example, if luck is an important factor in determining promotion outcomes, then employees are less willing to increase their efforts for a given level of wage spread (DeVaro, 2006b), thereby requiring firms to widen the pay gap (Connelly et al., 2014). Following the same logic, Lazear (1998) further suggests that this may be particularly important for studies which tend to compare compensation policies and plans across industry or national contexts.

Moreover, previous experimental studies, such as Dechenaux et al. (2015) provide evidence that tournament incentives may lead to disincentive effects, in that a lower ability executive often reduces his/her effort when competing against a higher ability executive. Coffey and Maloney (2010) study how the "thrill of victory" matters to contestants and induces increased effort. They find that individuals appear to make their best effort when they perceive that there is a reasonable chance of winning. However, Cason et al. (2010) evidence that lower ability individuals are less likely to participate in a tournament at all, even when they would benefit from participating. Therefore, it appears that that tournament incentives can cause substantial disincentive effects when individual contestants possess mixed abilities.

Last but not least, researchers have extended the basic model to investigate how value functions change in sequential tournaments. According to Rosen (1986), the proportion of the prize increases by level in sequential tournaments as the value functions include not only the higher prizes, but also the value of the possibility of competing for further prizes at higher levels. In other words, relatively higher tournament rewards are needed to offset the greater risk of losing, as the likelihood of progressing to the next level of the corporate hierarchy decreases. A number of studies provide evidence on this issue (Baker et al., 1994; Gibbs, 1995; Lazear, 1995; Leonard, 1990). The riskiness of the contest could be influenced by changing the number of participants competing for a promotion. This is because the possibility of promotion decreases with an increase in the number of competitors. For example, Bognanno (2001), using a group of firms, conclude that '…pay rises strongly with hierarchical level. Furthermore, the winner's prize in the CEO tournament increases with the number of competitors for the CEO position' (p.290). The riskiness of the competition also rises when firms are more likely to hire someone from the external labour market. Moreover, it can be influenced by the extent to which an employee's performance in the corporation is subject to 'chance'.

2.2.3 How to motivate the CEO in the tournament model?

In addition, the means whereby the tournament model might motivate a CEO, who is already at the top of the corporate hierarchy and, therefore, cannot be promoted internally any further, has also been an issue for the model. According to tournament theory, a compensation gap encourages only the CEO candidates (subordinate managers), rather than the incumbent CEO. Hence, instead of within-firm contests, some alternative approaches are needed to elicit additional output from an incumbent CEO. Two approaches are envisioned following the evidence of prior literature.

First, the provision of job opportunities for prospective CEO candidates in a larger firm within the inter-firm labour markets, is one alternative motivational technique, because CEOs with greater ability can receive substantial payments, from a larger firm (e.g., Baker et al. 1988). Therefore, recognition that tournament contests may also happen in inter-firm labour markets offers a possible path for CEO promotion (Vandegrift & Brown, 2003). However, some studies question the value of inter-firm mobility, which is a key feature of the modern labour market. Will tournament theory become less relevant if a firm hires a CEO from an outside labour market, rather than through internal promotions? A possible answer is that the increased possibility of recruiting CEOs from external markets does not reduce the power of tournaments for motivating lower-ranked managers (Lazear & Rosen, 1981). The prospective CEO candidates could look for promotion opportunities outside the firm but within the industry, only when industry tournament incentives are strong. Gudell (2011) finds that a CEO switching to another company assuming the same role receives a remuneration premium. However, even if the industry prize is high enough, some CEOs will be willing to serve the same company if they can negotiate increased pay in the current job by revealing their industry tournament opportunities (Coles et al., 2017).

Second, CEOs can also be motivated to perform through "on-the-job discipline…achieved by demotion, retirement, or outright separation of a poorly performing CEO from the corporation" (Demsetz, 1995, p 110). It is possible to monitor CEOs directly, because they have decision-making authority that might be reflected in firm performance. Previous research has identified that poor firm performance leads to CEO termination (Kay, 1997). Since, the chances for the non-CEO executives to get promoted to CEO position increase with the departure of the incumbent CEO, those executives have stronger incentives to monitor CEO behaviours. Thus, a CEO will be less likely to engage in unethical activities, thereby, alleviating the need to use 'pay for performance' as a tool for controlling agency costs.

Besides, some social scientists have suggested that monetary rewards are intrinsically unlikely to encourage individuals towards high achievement. Monetary motivation may occur for CEOs who achieve their position by eliminating opponents in promotion contests (probably multiple rounds), but even those who admit that money could be a general motivator, doubt whether financial incentives can have a material effect on executives with substantial income already (Anabtawi, 2005). To the extent that monetary compensation can be used as an incentive for CEOs, it may simply be a symbol of identity, rather than a performance incentive (Bebchuk & Fried, 2005). Bebchuk and Fried (2005) suggest that ego is the primary driver of CEO behaviour, with money playing a secondary role. These findings suggest that a substantial tournament prize is sufficient to satisfy an incumbent CEO, and that additional rewards are not necessary to motivate her to perform.

2.2.4 Section summary

Tournament theory provides a theoretical foundation for explaining pay without performance. Tournament models are consistent with actual compensation arrangements within the managerial ranks of companies and can also provide strong performance incentives

(Anabtawi, 2005). Compared to a 'pay for absolute performance' approach, tournaments offer companies the possibility of encouraging executives to perform better. Although tournament theory does not fully address how to motivate the incumbent CEO, there are avenues for addressing these difficulties.

2.3 Determinants of tournament incentives

In this section, we review the literature on the determinants of tournament incentives. Although there is a large empirical literature on the consequences of tournament incentives, fewer studies have been carried out on their potential determinants. We organize our review by categorising the determinants into (i) firm-level fundamental determinants and (ii) culture and institutional determinants.

2.3.1 Firm-level characteristics and tournament incentives

A large body of empirical research has found that firm-and manager-specific characteristics, such as firm size, volatility, stock return performance, CEO age, CEO tenure, and institutional ownership, affect compensation structure (Edmans et al., 2017; Ryan and Wiggins, 2001). A natural starting point, therefore, for researchers on the determinants of tournament incentives, was to examine whether some of these variables also affect the tournament-based incentive schemes. We categorize such determinants into four groups: (i) firm-level factors (ii) industry-level factors; (iii) managerial characteristics; and (iv) corporate governance factors.

2.3.1.1 Firm fundamentals and tournament incentives

Kale et al. (2009) and Burns et al. (2017) find that firm size is related positively to the compensation gap between CEO and other executives. Kale et al. (2009) also expect volatility

and number of segments in which a firm operates should be associated positively with the tournament size, defined as the size of the pay differential between the CEO and top executives. However, they fail to find any such evidence. Using a group of Dutch listed companies, Sahib et al. (2018) find that acquisitive growth increases the size of the tournament prize, while organic growth has no effect on it. Firms growing via acquisition lead to a bigger candidate pool, who compete for CEO promotion, thereby, a larger tournament prize is needed to compensate the lower likelihood of promotion for individual executives.

2.3.1.2 Industry-level factors and tournament incentives

Industry-level factors having explanatory power for the pay gap include median industry-pay-gap and industry homogeneity. This follows the theoretical premise that companies benchmark managerial remuneration to that of similar companies in the industry (Murphy, 1999). Kale et al. (2009) find that the median industry compensation gap is related positively to the size of the individual firm compensation gap, and that industry homogeneity affects tournament size negatively through its impact on promotion probability.[6]

2.3.1.3 Managerial characteristics and tournament incentives

Furthermore, some tournament studies document an association between managerial characteristics and tournament size, through the indirect effect of the probability of promotion among executives. For example, Kale et al. (2009) show evidence that CEO age (CEO experience) negatively (positively) affects the size of the tournament prizes. Furthermore, CEO insider/outsider status may affect the size of the tournament prizes indirectly through its effect on the probability of promotion among executives. If the new CEO is recruited from the

[6] In homogeneous industries, there is a greater likelihood of hiring an outside CEO as well as improved outside employment opportunities for VPs. Therefore, the probability of an internal promotion will be lower leading to a less effective tournament in homogenous industries.

external market, the promotion chance for existing executives decreases further, as they come to believe that the next CEO will be recruited from the external market, as well. As a result, the compensation gap should be greater, to prevent executives from lowering their efforts in face of a greater likelihood of hiring an outside CEO. They further investigate a potentially positive aspect of the compensation disparity between the CEO and the next level of executives, including the CFO and document a positive relationship. The positive association can be justified, as the higher the chances for the incumbent CFO to be promoted to CEO, the lower the possibility of promotion for other executives, so the pay gap should be increased to encourage other executives to exert more effort. However, Mian (2001) documents that only about 5% of the CFOs attain the position of CEO, indicating that the position of the CFO is usually a terminal one. Consequently, when the CFO is one of the VPs, the probability of promotion is greater for the other VPs: a probability that might imply a negative relation between CFO designation and the pay gap. Therefore, future research should consider executive heterogeneity concerns. If there exists substantial heterogeneity, then researchers should create sub-contests, in order to make executives compete with a more homogeneous subgroup or put some barriers to increase the win probability for disadvantaged executives (Gomez-Mejia et al., 2009; Pfeifer, 2011).

Kale et al. (2009) further hypothesize that CEO duality should be related to tournament size positively but fail to find supporting evidence. However, Burns et al. (2017) find a positive association between CEO duality and the compensation gap by using cross-country data. Since CEOs who hold the position of chairs may have great power, they are more likely to influence their remuneration relative to the other executives. The conflicting result may stem from different institutional settings as Kale et al. (2009) focus on the U.S. market, while Burns et al. (2017) is a cross-country study, which includes 14 countries, such as the U.S., Canada and

China. Therefore, we call for future studies to explore and confirm the role of CEO duality on the pay gap in different contexts.

Apart from the aforementioned CEO characteristics, CEO personal traits, such as CEO overconfidence, could also help explain the size of the tournament prize. Vitanova (2018) finds that overconfident CEOs are more willing to offer tournament incentives for the top executives, which enhances firm performance. This finding might be contrary to the managerial 'overconfidence' literature, which generally documents adverse consequences (e.g., Plöckinger et al., 2016). However, overconfident CEOs may adopt tournaments to motivate the top management team to work hard: an action that will be beneficial for him as well, in terms of performance implications.

2.3.1.4 Corporate governance factors and tournament incentives

Finally, firm-level corporate governance variables have also been found to affect the tournament structure. Burns et al. (2017) find that institutional ownership and board independence are related to the pay gap positively, but board size is related negatively. However, the positive relationship between insider ownership and pay gap is inconsistent with previous studies. Mehran (1995) finds that insider ownership is associated with the use of equity-based compensation negatively. Chen et al. (2014) find that board affiliation (the proportion of directors appointed by block shareholders) can increase the compensation gap, because of affiliated director reliance on executive directors. Board affiliation might therefore reduce directors' independence and impair the efficiency of their supervision. Moreover, state ownership also has a great impact on tournaments, as Chen et al. (2011) find that the compensation gap between the highest-paid executive and the second highest-paid executive is bigger than the compensation gap between the second and the third highest-paid executive. However, such an effect is less pronounced for SOEs, as higher state ownership decreases the

compensation gap between different organizational levels. Kato and Long (2011) find that tournament size is increased to prevent executives from reducing their effort in the face of an increasing number of competitors, or when faced with noisy performance measures used to determine the tournament winner. Again, this effect is less pronounced for SOEs.

In addition to the board and ownership structure, the compensation committee may also play an important role in the design of corporate tournaments, because the compensation committee bears the responsibility for setting managerial pay, including performance-based incentive pay (Conyon & Peck, 1998; Daily et al., 1998). However, no study yet exists that examines whether the compensation committee affects the level and structure of tournament incentives.

2.3.2 Culture and tournament incentives

Hofstede (1980) suggests that culture will affect the personal thinking about corporate power structure and pay inequity. This, therefore, implies that cultural values will affect decision-making about executive compensation, including the tournament plans. Using cross-country samples, Burns et al. (2017) investigate this proposition and confirm that the cultural values of power distance, income inequality, and competition are related, significantly and positively, to variations in tournament structures. For firms with greater power distance, a positive perception of pay inequity and/or competition will lead to a steeper tournament structure. For example, they show that the sample of U.S. CEOs receives a larger tournament payoff than does the sample of CEOs from other countries, and this difference is mainly driven by the "winner-take-all" culture in the U.S. (Frank & Cook, 1995). Following this culture, the receipt of enormous benefits is more acceptable, since U.S. CEOs have more power than their counterparts in other countries. Results further show that the tournament structure results in better firm performance in countries characterized by the presence of all the three above-

mentioned cultural attributes. Future research should investigate the effects of other non-economic institutional factors, such as religion and social trust, on the existence and performance implications of tournament incentives.

Some compensation papers argue that different theories can work together jointly to explain the compensation gap. For example, Jiang et al. (2019) use tournament theory, managerial power theory and social comparison theory, and report that the cultural differences among chairpersons influences the pay disparity between executives and average workers in China. The findings show that the pay gap in a company run by a chairperson from a collectivist culture tends to be narrower than that of a company run by an individualism-oriented chairperson, who is more focused on individual success and risk-taking. Using tournament theory and managerial power theory, Borghesi and Chang (2018) discuss how personal political ideology can help explain the degree and structure of the pay gap, since corporate individuals' political favour affects their decision-making indirectly. They find that for firms with Democratic CEOs, the compensation gap is smaller than it is for firms with Republican CEOs. Republican CEOs favour individual rights and free markets and are more likely to enlarge the pay gap. On the other hand, Democratic CEOs are focused on social and economic equality, and are less likely to use their power to influence the board for higher payment.

2.3.3 Section summary

This section summarizes the determinants of tournament incentives. Relevant papers are summarized in Table 2.1. Our review reveals that a number of firm-level fundamental and corporate governance variables, affect the level and structure of corporate tournaments. Research also finds that cultural values, such as: power distance and pay equity; also influence the size of the tournament prizes.

Table 2.1: Determinants of tournament incentives

Author and year	Research question	Sample	Justification for sample selection	Measurement of tournament variable	Alternative controls	Findings	Economic Significance
Borghesi et al. (2008)	Political affiliation and CEO pay gap	U.S.: 6,443firm-year observations during 2000 to 2014	No	Pay gap ratio (total CEO compensation divided by the median of the five highest paid executives' compensation).	No	The political ideology of the CEO influences tournament structure. Democratic CEOs (republican CEOs) accept significantly lower (higher) pay gap Thus, tournament incentives are less effective for firms that need coordination (democratic leadership), but more effective for firms with severe monitoring problems (Republican CEO)	No
Mobbs & Raheja (2012)	The determinants of the promotion method selected by firms	U.S.: 87,924 qualifying executive-years for 16,801 firm-years for the years 1997 to 2008	No	Non-CEO executives are considered to be contenders for the next CEO if their propensity score is within 10% of the highest score in their firm. If a firm only has one (multiple) contender(s), the firm is classified as a successor (tournament) -incentive firm	No	Although the common measure of tournament incentives correctly asserts that the larger the pay gap the greater the tournament incentive; this measure is only relevant if the firm has a tournament structure in place. Degree of firm-specific human capital and CEO labour market influence whether a firm chooses a tournament or selects an heir	The average change in operating performance in tournament (successor)-incentive firms is associated with a conditional probability of CEO turnover of 0.0407 (0.0922)
Burns et al. (2017)	National culture, firm-level characteristics and tournament structure	Cross-country: The primary sample contains 22,045 firm-years over the	No	CEO_PAY_RATIO: the total compensation of the CEO divided by the mean compensation of other executives.	No	The cultural values of power distance, fair income differences, and competition are associated with variations in tournament structures significantly. Firm size,	For example, there is an 11% increase in CEO_PAY_SLICE for a one standard deviation increase in

		period 2006–2010 for 14 countries		CEO_PAY_GAP: the difference in total compensation between the CEO and the median of other executives. CEO_PAY_SLICE: the percentage of compensation for the top executives that goes to the CEO		institutional ownership, board size, and CEO duality have an impact on corporate tournament	the cultural value of power distance
Sahib et al. (2018)	Firm growth decomposed into acquisitive and organic growth and pay disparity	Netherlands: about 400 observations during 2002 to 2006	Yes	The natural logarithm of the difference between CEO compensation and the median compensation of other TMT members in a year	No	Acquisitive growth, measured through the number and size of acquisitions, increases CEO-TMT pay disparity while organic growth has no effect on such pay disparity	No
Jiang et al. (2019)	Chairperson collectivism (a proxy for culture difference within China) and compensation gaps between managers and average workers	China:7,003 observations during 2001 to 2014	No	Pay gap between executives and employees as the average executive cash compensation divided by the average employee compensation	CEO tenure	The compensation gap in a company run by a chairperson from a collectivistic culture tends to be smaller than that of a company run by a chairperson from an individualistic culture. This effect is more striking if a chairperson has a longer tenure and works in a SOEs or in a firm located in collectivistic regions	The pay gap is reduced by 8.7% relative to the mean sample pay gap, if a chairperson from Northern China is replaced with one from Southern China

2.4 Consequences of tournament incentives

In this section, we review the literature that explores the consequences of tournament incentives. We group the studies into (i) financial reporting and auditing; (ii) firm-level operational; and (iii) capital market consequences of tournament incentives.

2.4.1 Tournament incentives and financial reporting and auditing consequences

2.4.1.1 Tournament incentives and financial reporting quality

The extant literature on the tournament consequences of financial reporting quality generally documents a 'dark side' of tournament incentives. Tournament incentives for non-CEO executives may induce aggressively competitive behaviour, thereby, affecting financial reporting quality adversely. Such damaging actions might include lower honesty levels (Conrads et al., 2014); cheating (Berentsen, 2002); and sabotaging other tournament participants (Lazear, 1989). The existence of strong tournament incentives might also motivate executives to engage in riskier projects (Ehrenberg & Bognanno, 1990; Goel & Thakor, 2008; Kini & Williams, 2012): the failure of which may necessitate the concealment of "bad news"; a reflection of deteriorating financial reporting quality.

Based on these fundamental arguments, Haß et al. (2015) investigate the association between tournament incentives and corporate fraud and document a positive association. To rule out the possibility that this association is driven by powerful CEOs who might exert pressure on their subordinate executives to commit fraud (Bebchuk et al., 2011), Haß et al. (2015) control for CEO power, as proxied by CEO-chairman duality and founder status, and by CEO/CFO equity incentives. They conclude that tournament incentives are the primary catalyst of corporate fraud in their sample.

Park (2017) documents that promotion-based tournament incentives induce more real earnings management (REM). Park (2017) offers three possible explanations for this positive relationship. First, senior executives are involved in daily operational activities and help CEOs/CFOs to carry out and supervise the corporate decisions made by them. Hence, executives have some discretion to implement these tasks, enabling them to engage in manipulative activities. Second, corporate boards are unable to detect REM, thereby, executives have a higher tendency to inflate earnings in order to enhance their promotion opportunities (e.g., Kim & Sohn, 2013). Third, powerful CEOs may force subordinates to engage in earnings manipulation to preserve their own reputation, financial benefits and priority status (e.g., Mande & Son, 2012). However, the empirical results support only the first two propositions. Furthermore, the documented positive association is less pronounced for firms in homogeneous industries, while it is more pronounced for firms with imminent CEO turnover; as the perceived possibility of immediate promotion is greater for senior executives. At the industry level, Huang et al. (2015) find, after controlling for CFO equity incentives, that industry tournament incentives motivate CEOs to engage in accruals-based earnings management in order to meet or beat the earnings expectations set by financial analysts. Meeting earnings benchmarks on a consistent basis can build credibility in the financial market, help maintain or increase the firm's stock price, improve CEO reputation in the managerial labour market, and enhance the possibility of taking a more desirable position in other firms (Bartov et al., 2002; Graham et al., 2005).

In contrast to the above studies that document an adverse effect of tournament incentives for financial reporting quality, Zhang et al. (2018) find that tournament incentives reduce the probability of accounting restatements in China. The occurrence of restatement will lower the reputation of an executive, as shareholders will suspect his/her capacity to maximize shareholder values. In an extreme case, the CEO might be dismissed in an attempt to restore

the damaged legitimacy. Therefore, executives are discouraged from taking actions that might cause restatements in the near future. They also find that the negative association is more pronounced for executives in SOEs, who are keen on getting political promotion to enjoy more perks. However, opportunities for such promotions can be considerably weakened by financial restatements. The inconsistent evidence from the U.S. and China, therefore, opens up an avenue for more research to explore the effect of institutional differences on the tournament implications for financial reporting quality. Bruce et al. (2005) rightly highlighted the importance of properly considering cross-country differences when studying top executive compensation contracts. It is important that future international studies provide explicit tests to confirm whether institutional differences, such as cultures, say-on-pay regulations, or labour market flexibility, moderate the association between tournament incentives and financial reporting quality.

Although the above studies provide interesting insights into the effect of tournament incentives on financial reporting quality, future research needs to investigate whether tournament incentives affect other dimensions of financial reporting quality. Two broad categories of financial reporting quality dominate the empirical literature (Dechow et al. 2010). Category 1 focuses on 'properties of earnings' including value-relevance; earnings persistence; earnings smoothness; earnings conservatism; and quality of corporate disclosures. Category 2 includes accrual-based earnings management, REM and financial restatements. Tournament incentives have been found to affect the second category of financial reporting quality, but no study yet exists that examines whether and why tournament incentives affect earnings properties.

2.4.1.2 Tournament incentives and auditors' response

Research has shown that auditors consider the structure of executive compensation plans in their audit pricing decisions. For example, Kim et al. (2015) find that CEO equity

incentives may lead to a higher probability of misreporting and, consequently, higher audit fees. Chen et al. (2015b) find that audit firms charge higher audit fees for firms with a higher sensitivity of CEO compensation portfolio to stock return volatility. Recent research has explored the effects of tournament incentives on audit attributes as well.

Using a large sample of U.S. firms, both Bryan and Mason (2017) and Jia (2017) find that firm-level tournament incentives for non-CEO executives are related to audit fees positively. The basic idea behind this, is that tournament incentives are more likely to induce greater risk-taking and financial misconduct, thereby, increasing audit risks. Auditors need to exert extra effort to obtain additional audit evidence caused by audit risk, hence, the perceived higher audit risk increases the possibility that auditors will charge higher audit fees. In addition, Jia (2017) finds this positive association between tournament incentives and audit fees is weaker for firms with a recent CEO turnover, in industries where outside succession is more likely, and for family firms. These settings are characterized by lower probabilities for subordinate executives' early promotion, thereby, reducing the probability for financial misreporting by such executives and, consequently, lower audit fees. However, this relationship seems to be stronger when firms are experiencing poor performance or have large abnormal accruals, and when the incumbent CEO is approaching retirement: conditions that exacerbate audit risk and, hence, increase audit fees. Jia (2017) controlled for CEO entrenchment, but Bryan and Mason (2017) did not. Since compensation gap is also used to capture CEO power, the results should be interpreted cautiously. Furthermore, the authors failed to document the mediating effects of risk-taking and financial reporting quality on the positive association between tournament incentives and audit fees. Given tournament incentives could lead to financial misreporting and higher risk-taking which have been documented to affect audit opinion (Fargher et al., 2014; Greiner et al., 2016), future research should explore the association between tournament incentives and audit opinion.

2.4.1.3 Section summary

In this section, we discuss the effect of tournament incentives on financial reporting quality and audit response. On one hand, tournament incentives for non-CEO executives may induce financial misconduct and necessitate the concealment of 'bad news': a reflection of deteriorating financial reporting quality and higher audit risks. Empirical evidence supports this perspective as current studies document that tournament incentives induce a higher likelihood of corporate fraud, more real earnings management activities, increasing trends in accrual-based earnings manipulation at industry level, and higher audit fees. On the flip side, Zhang et al. (2018) provide evidence that tournament incentives could reduce the occurrence of accounting restatements. The conflicting evidence warrants further cross-national research to explore the role of institutional differences in affecting differentially the associations between financial reporting quality, audit fees and tournament incentives.

2.4.2 Tournament incentives and firm-level operational consequences

2.4.2.1 Tournament incentives and firm performance

Given that the primary purpose for an appropriately designed executive compensation scheme is to enhance firm performance, it is unsurprising that researchers have also explored the effects of tournament incentives on firm performance. In an early study, Henderson and Fredrickson (2001) tested for the opposing prediction of large pay gaps: behaviouralists' view of large pay gap undermining performance by creating feelings of relative deprivation among subordinates, versus economists' view that large pay gaps are beneficial when substantial coordination is required. They find that although economic theory was a better predictor of the size of CEO pay gaps, there was a balance between the economic and behavioural views as predictors of firm performance. Lee et al. (2008), Kale et al. (2009) and Kale et al., (2010)

document a positive relationship between tournament incentives and firm performance in the U.S. market. Kale et al. (2009) and Kale et al. (2010) further show that this association is more pronounced when the incumbent CEO nears retirement, because that condition opens an opportunity for the next executive in the promotion ladder. However, this association is less positive when a firm has a new CEO and weakens further when a firm hires a new CEO from the external labour market, as these instances decrease promotion possibilities. Siegel and Hambrick (2005) provide empirical evidence for the harmful impact of tournament competition on firm performance for high-technology firms. For such firms, collaboration rather than competition is a key to their success.

Apart from within-firm tournament incentives, industry and regional tournament incentives also affect firm performance. Coles et al. (2017) find that industry tournament incentives, measured by the pay gap between the CEO and the most highly compensated CEO in the firm's industry, also increase firm performance and encourage riskier policies. That is because when CEOs outperform other CEOs through high quantity or quality of managerial effort, or through value-increasing risk-taking policies, then they are more likely to be moving up to larger and more prestigious companies. Such positions can be attractive because of higher payment, enhanced span of control, high visibility, and high status as CEO of a leading company in the industry. However, risky projects have a greater impact on firm performance (Naldi et al., 2017). Coles et al. (2017) did not test whether risk-taking behaviours could be a channel through which industry tournament incentives affect firm performance. As in the effects of industry tournaments, Ma et al. (2020) find that 'local tournament incentives', proxied by the compensation gap between an executive and higher-paid executives in the area, is associated positively with firm performance, risk-taking and misreporting, after controlling for the potential confounding effect of the within-firm pay gap.

With respect to bank performance, Chircop et al. (2018) document that the CEO pay gap is associated with an increase in bank returns and a decrease in bank risk, whilst the pay gap between executives and bank employees (VP pay gap) is associated with bank risk positively. Taken together, the positive association between CEO pay gap and bank performance is driven by pay sensitivity to bank performance, which encourages more efficient risk taking by non-CEO executives. Since the VP compensation is sensitive to negative bank returns, VPs are likely to engage in efficient risk-taking so that they can acquire higher returns for each unit of risk. Conversely, rank-and-file employee compensation is insensitive to bank performance, hence the VP pay gap (VPs and employees) induces rank-and-file employees to engage in unduly risky activities. Such inefficient risk-taking strategies makes a VP pay gap detrimental for the company.

However, Crawford et al. (2014) find a significant concave association between CEO-employee pay disparity) and firm performance for a sample of bank holding firms: pay gap increases firm performance up to a point, but beyond that point, an increase in pay gap affects performance adversely. The positive association is explained through tournament theory, whereby executives and employees are motivated to work toward higher firm performance targets to attain promotion and associated benefits. However, the negative association stems from the excessive pay gap engendering feelings of inequity, deprivation and outright sabotage: features that are consistent with the equity fairness theory. However, the use of alternative theories to explain the increasing versus decreasing performance effects of a pay gap is dubious in light Lazear and Rosen's (1987) statement: productive output from the tournament is maximized only when the prize is "optimal".

In the non-U.S. context, a positive relationship between pay gap and firm performance was confirmed by Eriksson (1999) for Denmark; while Conyon et al. (2001) found no significant relationship between pay gap and firm performance for a sample of UK firms. But

Tarkovska (2017) finds that the high pay gap between the CEO and each of the top five executives is likely to impact the executive team's spirit and motivation negatively, which lowers firm performance for a sample of UK firms: a finding that is consistent with social comparison theory, whereas tournament theory might be supported only when the CEO is close to retirement.

In China, Lin and Lu (2009), Hu et al. (2013), Lin et al. (2013), Pan et al. (2010) and Xu et al. (2016) document a positive relationship between tournament incentives and firm performance. Xu et al. (2016) further document that the difference between the average compensation level of top executives and the average payoff of their industry peers moderates the positive relation. However, they find that the results hold for non-SOEs only. Consistently, Chen et al. (2011) and Kato and Long (2011) find that that an increase in the tournament size will enhance executives' efforts and, consequently, firm value, but only for non-SOEs. Compared to executives in non-SOEs, executives in SOEs are less sensitive to explicit pay comparisons with peers, as they are compensated with massive implicit perks. Pan et al. (2010) document that the positive association between tournament incentives and firm performance is more pronounced in SOECG and SOELG-controlled firms[7], arguing that the agency problem is more severe in such firms, as the government is too detached from those companies and is unable to supervise executives effectively, thereby, making tournament incentives a more useful monitoring mechanism in SOEs. But it is still questionable as to whether tournament incentives play a more effective role enhancing firm performance in firms with ultimate state ownership. For example, Chen et al. (2009) state that SOECGs are subject to strict supervision and monitoring from several departments under the central government, including the National Audit Office (NAO). This statement contradicts Pan et al. (2010), above, who claim the

[7] Chen et al. (2009) group China's listed companies into those controlled by state asset management bureaus (SAMBs), SOEs affiliated to the central government (SOECGs), SOEs affiliated to the local government (SOELGs), and private investors. They find that SOECGs perform the best, whilst SAMBs and private-controlled firms perform the worst, with SOELGs in the middle.

government is too detached from those companies and is unable to supervise executives effectively. Moreover, Hu et al. (2013), document a weaker relationship, arguing that executives in SOEs face multiple tasks to gain political promotion, including assisting the government to satisfy social objectives instead of enhancing firm performance. Because explicit managerial compensation was constrained by the "pay cap" policy[8] launched by the government, thereby, narrowing the pay gap, tournament incentives became less attractive for executives in the SOEs.

Talavera et al. (2018) find that the positive link between tournament incentives and firm performance for a sample of Chinese companies is stronger (weaker) when senior executives are from the same age cohort (three or more age cohorts). This is likely to be due to 'peer pressure' among similar-aged executives, enhancing the tournament competition but reducing the incentives for younger executives to compete as the age hierarchy widens. In addition, another Chinese-based study done by Dai et al. (2017) document an inverted-U relationship between pay gap and firm productivity: an association that is more pronounced for firms with low industry concentration, and with highly skilled employees. However, neither tournament theory nor equity theory, individually, appears to explain this association. In the U.S. context, Faleye et al. (2013) find that CEO-employee pay ratio does not necessarily capture an ideal setting for conventional tournament incentives, because the managerial compensation is not disclosed to ordinary employees and even they are well informed, their limited ability and/or incentive make it difficult to act on such information. However, in some special circumstances, for example, in firms with relatively few employees that are well-informed about executive pay, such a ratio can act as a proxy for tournament incentive.

[8] The 2014 "pay cap" policy implemented by the State-owned Assets Supervision and Administration Commission (SASAC) aims to narrow the remuneration difference between executives and average employees in SOEs, to a ratio of 12:1 to 7:1 or 8:1. (State Council, 2014).

Unlike the above studies which explore the effect of pay gap on firm performance under tournament theory, there are studies that find different evidence using other perspectives. Bugeja et al. (2017) find no relation between pay gap and subsequent firm performance, as is consistent with an efficient contracting explanation of CEO compensation, rather than the managerial power perspective. The authors contend that the pay difference primarily reflects a rational allocation of decision authority between the CEO and other senior executives. This is compatible with a firm's economic characteristics: a view that contradicts the managerial power explanation of the pay difference. Moreover, Vieito (2012) sheds some new light on how gender affects the relationship between compensation gap and firm performance. He finds that, on average, companies managed by female CEOs (more cooperative) perform better and have a smaller compensation gap between the CEO and VPs than companies managed by male CEOs (more competitive). The results provide empirical support for behavioural (tournament) theory as being better able to explain the pay differential for female (male) CEOs.

2.4.2.2 Tournament incentives, firm risk and innovation

Senior executives facing strong competition for promotion to a CEO position will increase firm riskiness by undertaking riskier investments and financial policies. In a tournament contest, only the best relative performer can reach the CEO position. It is unlikely that all executives will choose the same level of risky projects, because they will get the same output at the end (Goel & Thakor, 2008).[9] More importantly, boards of directors cannot fully capture the true managerial performance, as it is difficult to distinguish whether 'managerial ability' or 'risk-taking propensity' leads to higher performance. Hence, in order to outperform others and enhance their promotion possibility, executives are more likely to assume greater

[9] In their model, if every senior executive chooses the same level of risk as her competitors in the CEO promotion tournament, then they will all have the same output at the end of the period. The probability of getting promoted for all the senior executives will also be the same, because their ability is a priori the same.

risk. The chosen risk level for all non-CEO executives will increase with the pay gap. But it does not mean that all executives will prefer to take on risky projects, since risk-taking is a trade-off, involving the costs resulting from reduced utility from riskier compensation versus the benefits from increased promotion possibility.

Kini and Williams (2012) find that tournament incentives induce non-CEO executives to increase firm risk by adopting risker policies (higher R&D intensity, firm focus and leverage, but lower capital expenditure intensity), in order to increase their chance of promotion. Yin (2017) tests the relationship between firm risk and local tournament incentives: the latter defined as the pay gap between a CEO and the highest-paid CEO in the same Metropolitan statistical area. They find evidence consistent with the hypothesis that CEOs who face higher local tournament incentives are more likely to implement riskier policies. However, little is known on the effect of these local peers on CEO tournament incentives. Hence, future study should explore whether firm/industry/or regional tournaments are complementary, or substitutes. Moreover, future research should also explore whether regional pay gap theory is equally applicable to research on the effects of tournament incentives on financial reporting quality, firm performance and audit outcomes.

Using a group of financial firms from 1992 to 2009, Cooper et al. (2014) find a positive association between tournament incentives and firm risk. However, this positive association is confirmed for the pre-crisis period only. The onset of financial crisis may have made executives more risk-averse, and less likely to be attracted to tournament incentives. In other words, the deteriorating economic condition harms job security and intensifies competition among executives. In these circumstances, executives will choose to enjoy a quiet life rather than deal with cognitively difficult decisions involved in risk-increasing activities.

Research has also explored whether tournament incentives affect corporate innovation: an oft-cited proxy to capture firm risk. However, competing arguments exist regarding the

association between tournament and innovation. On one hand, higher tournament incentives induce some executives to engage in excessively risky activities which could be detrimental to corporate innovation efficiency (Gilpatric, 2009). On the other hand, tournament-based competition could encourage executives to enhance innovation efficiency, because poor performance caused by riskier projects increases the threat of subsequent job losses. Empirically, Shen and Zhang (2017) document that tournament incentives are related positively to innovation efficiency (measured by the number of patents and patent citations generated per million dollars of R&D expenses). Furthermore, they find that the positive effect of tournament incentives prior to CEO turnover is particularly pronounced when an insider (i.e., one of the VPs) is eventually appointed as the new CEO, and when VPs expect a high probability of CEO turnover in the foreseeable future. Jia et al. (2016) also find similar results. Importantly, Jia et al. (2016) find that better human capital (measured by innovation productivity of individual executives and the number of executive inventors) and the reduction in excessive interventions by corporate boards appear to mediate the positive association. Lonare et al. (2019) find that industry tournament incentives, proxied by the pay gap between a firm's CEO and the second highest paid CEO in a same industry, is related to product innovation significantly and positively, after controlling for within-firm tournament incentives. Product market competition strengthens this association, whereas the lower probability of promotion through labour market mobility weakens it.

However, tournament incentives could also have a negative effect on firm innovation by, for example, destroying collaboration and coordination among executives in high-technology industries, as documented by Siegel and Hambrick (2005). However, no such evidence exists as of yet in research in the accounting and finance discipline. In addition, since tournament incentives could lead to higher risk-taking, such as R&D investment: and higher

levels of R&D investment may increase the likelihood of financial distress (Zhang, 2015); a possible future path is to investigate whether tournament incentives lead to bankruptcy risk.

2.4.2.3 Tournament incentives and tax avoidance

The implementation of promotion-based tournament incentives might influence corporate tax policies. Kubick and Masli (2016) report that tournament incentives facing the CFO[10] are associated with tax aggressiveness positively after controlling for the effect of both CEO and CFO equity incentives (Rego & Wilson, 2012). Because tournament incentives promote greater risk-taking, CFOs might pursue more aggressive tax policies, because such actions have the desirable outcome of reporting more earnings and retaining more cash: two strong performance indicators pertinent to promotion. Kubick and Lockhart (2016) further confirm the positive link between industry tournament incentives and tax aggressiveness. CEOs facing greater industry tournament incentives are more willing to conduct aggressive tax reporting for better firm performance, thereby, increasing the likelihood of winning the industry tournament. Furthermore, the association is *weaker* in heterogeneous industries which offer the CEO fewer outside employment options. This positive relation is also strong in industries where competition for CEO talent is high and, also, among CEOs estimated to have greater ability, because outperformed CEOs have more external employment opportunities.

2.4.2.4 Tournament incentives and managerial turnover

Bloom and Michel (2002) find that promotion-based tournament incentives increase the lower-level manager turnover rate, because lower-level managers are forced to accept both lower status and substantially less pay. Kale et al. (2014) find that firms with large pay

[10] Kubick and Masli (2016) focus on tournament incentives for CFO as CFO is more likely to be directly involved in corporate tax policy. They measure tournament incentives as the pay gap between the CEO's and CFO's total compensation.

inequalities, both within the firm and relative to benchmark firms, are associated with high VP turnovers and resignations. This finding suggests that the market for VPs functions well, thus, more able VPs are paid more, which other firms can observe and can offer compensation premiums to hire them. Prior research documents that VP turnover affects firm performance and corporate innovation adversely, because of loss of precious human and social capital associated with the resigning VPs (Wang et al., 2015). Therefore, future research should explore whether VP turnover could be considered as a channel that may explain the influence of tournament incentives on firm-level consequences. At the CEO level, using data from a sample of 313 large U.S. companies from 1988 to 1997, Shen et al. (2010) document that the pay gap has a negative impact on CEO turnover, which is consistent with a managerial power perspective, i.e., CEOs with greater power can design their own pay, since they have stronger influence over board decisions. Byun (2014) states that the tournament and the pay equity theories together can explain the impact of pay dispersion on managerial turnover. The author finds that abnormal pay dispersion, captured by a pay gap that is too high or low, is associated with higher executive turnover rates and lower firm performance. When pay dispersion is too high, low-ranked executives are less-motivated to work harder, which affects firm performance adversely and, therefore, increases the probability of management turnover. However, when the pay gap is too low, high-ranked executives become dissatisfied, as the rewards are not commensurate with expectations, forcing them to seek external employment opportunities.

2.4.2.5 Tournament incentives and other firm operational consequences

Shi et al. (2016) report that executive tournament incentives are related positively to securities class action lawsuits: an outcome that could stem from a higher likelihood of engaging in managerial wrongdoings (e.g., overly optimistic statements about project initiatives). Hart et al. (2015) find that a higher pay gap is associated with corporate social

performance (CSP) negatively, because "…Firms with high vertical pay disparity structures foster competition and individual ambition which is linked with a profit-maximizing, shareholder orientation…and will not exhibit the requisite stakeholder-centric attitudes of egalitarianism…needed to effectively manage complex stakeholder issues…, resulting in lower CSP" (p.204). Gnyawali et al. (2008) examine how the compensation gap between CEO and the remaining four highest paid executives affects firm competitive behaviours: competitive activity and competitive complexity. Higher tournament prizes motivate executives to undertake more competitive actions within their area of operations, but lack of cooperation and possible sabotage behaviour may increase corporate competitive complexity.

2.4.2.6 Section Summary

With respect to firm-level operational consequences, research has found that strong tournament incentives improve firm performance, boost firm innovation, encourage more risk-taking and increase tax avoidance, as well as increasing executive turnover and the probability of lawsuits. However, the channels through which tournament incentives influence various operational consequences require further research attention. Besides, whether tournament incentives have an impact on corporate governance issues is still unclear, as very little research has been conducted in understanding the moderating effect of cross-country institutional differences on the association between tournament incentives and changes in corporate governance practices.

2.4.3 Tournament incentives and capital market consequences

2.4.3.1 Tournament incentives, cost of capital, and stock liquidity

The risk-taking incentives associated with CEO tournaments may affect firms' credit quality adversely. Du et al. (2019) suggest that within-firm tournament incentives can help to reduce credit risk, especially for firms with strong corporate governance or product-market

competition. However, at the industry-level, Kubick et al. (2018) find that industry tournament incentives lower credit ratings and increase the cost of bank loans significantly. This is owing to creditors' price-protection strategies, as they cannot fully foresee the changes in corporate policies post-lending. Since tournament incentives may encourage greater risk-taking, which could prove detrimental to creditors, creditors are more likely to lower the firm's credit ratings. However, they did not confirm whether such firms actually engaged in risk strategies: a shortcoming of their research. They also find that a widening pay gap increases short maturity-debt as well as the intensity and strictness of debt covenants. Huang et al. (2019) investigate whether industry tournament incentives affect firm liquidity. They find that industry tournament incentives, after controlling for within-firm pay gap, enhance the level and marginal value of cash by providing CEOs with career-enhancing incentives to pursue value-enhancing cash policies. Further, for firms with excess cash, higher industry tournament incentives lead to increased R&D expenditures and spending on focused acquisitions, and reduced shareholder pay-outs. In addition, industry tournament incentives strengthen the relation between firm cash holdings and market share gains. Phan et al. (2017) document similar results in the context of a within-firm tournament setting. However, different to Huang et al. (2019), their evidence indicates that because within-firm tournament incentives motivate riskier corporate policy choices, impeding corporate investments owing to greater cash-flow uncertainty, firms are more likely to hold larger cash reserves to alleviate potential liquidity shortfalls and avert underinvestment. Moreover, this effect is stronger for financially constrained firms, as they suffer a higher probability of underinvesting, owing to either lack of adequate access to external capital, or access only at higher cost.

Research has also explored the effects of tournament incentives on the cost of capital and acquisition returns. Huang et al. (2018) find negative relations between CEO pay gap and default risk, cost of debt, and number of restrictive debt covenants, but a positive relation

between CEO pay gap and debt maturity. However, their findings are consistent with the CEO productivity explanation for the CEO pay gap, rather than with the tournament incentives and CEO entrenchment perspectives.[11] Furthermore, using tournament theory and managerial power theory, Chen et al. (2013) find that pay disparity is related positively to the cost of equity. The positive relationship is stronger when a CEO successor plan is more important, and when the agency problems of a free cash flow are severe: findings that are consistent with the managerial power perspective. Nguyen et al. (2017) document a positive relationship between the CEO-senior executives' pay difference and both firm acquisitiveness and acquisition risk. They support the CEO relative productivity perspective rather than the tournament perspective: however, they did not provide enough evidence on why CEO relative productivity could better explain this relation. To et al. (2018) find that acquirers with greater tournament incentives experience lower announcement returns. Further analysis shows that this negative effect is driven by overly risky deals, and the effect is stronger during the period when a promotion tournament is most likely to occur. Although overly risky acquisitions may damage shareholder value, executives still support such risky acquisitions to increase their own probability of advancement to the CEO position, since these projects can yield more extreme outputs. The negative relationship persists even after controlling for CEO entrenchment, thus, supporting the tournament effect.

[11] A CEO's higher compensation is attributable, not only to the CEO's individual performance, but also to the multiplicative productivity gains associated with the resources and subordinates under the CEO's supervision. A more productive CEO, therefore, is expected to make a greater contribution to the firm's operating performance and value, benefitting both shareholders and creditors. Such benefits are manifested through lower default risk, issuance of long-maturity debt, and debts with lower cost and fewer restrictive covenants.

2.4.3.2 Tournament incentives and future stock price crash risk

Stock price crash risk is related to negative skewness in the distribution of returns for individual stocks (Chen et al., 2001). Concealing bad news through less transparent financial reporting can be a primary cause of price crash. When the accumulated bad news is released to the market, it can result in a sharp decline in stock prices (Hutton et al., 2009; Jin & Myers, 2006). Jia (2018a) documents a robust positive association between tournament incentives among senior executives and stock price crash risk using data from the U.S. This is consistent with tournament incentives inducing managerial wrongdoings and, hence, concealment of bad news, as non-CEO executives believe heightened risk of unethical behaviours is worth the potential payoff of increased pay from winning the tournament for the top job. However, Sun et al. (2019) explore the Chinese setting, dominated by a cash-based compensation system unlike its U.S. counterparts, where equity-based incentive schemes are more commonly found. They find a negative and significant relationship between tournament incentives and price crash in China. Sun et al. (2019) further document that that conditional conservatism mediates the negative association between tournament incentives and price crash. Chen et al. (2018), too, show that political promotion incentives constrain the occurrence of firm price crash in listed SOEs in China. Executives of SOEs also function as government officials with political ranks, which makes them compete in a relatively closed internal labour market. Maintaining their current position and working towards promotions within the state sector is a more attractive career pathway. Hence, executives in SOEs are risk-averse. Moreover, compared to low-ranking executives, high-ranking executives have less incentive to engage in risky projects to boost financial performance. As a result, high-ranked executives are discouraged from conducting risky activities, thereby, further reducing the risk of price crash.

The contradictory evidence on the relationship between tournament incentives and crash risk depicted above might be due to different institutional characteristics. For example,

China and the U.S. have a totally different executive compensation system, as cash compensation is still the dominant way to compensate executives in Chinese listed firms. Moreover, unlike listed firm in the U.S., over 50 percent of listed firms are state-owned and influenced by political power. With the increasing trend for equity incentives to be used in Chinese firms, it would be interesting for future research to explore whether equity-based tournament incentives lead to high rates of price crash, as documented in the U.S., and whether state ownership plays a role in the tournament-price crash association. More importantly, the negative/positive coefficient on tournament incentives in itself does not inform readers about the bad news hoarding theory. It is therefore important to examine the channels through which tournament incentives curb bad news hoarding and crash risk. Up to now, financial reporting quality and risk taking are used as mediator. However, except for Sun et al. (2019), who find conditional conservatism partially mediates this relation, no further papers provide evidence on this issue. Hence, it is important for future study to provide explicit tests to isolate the direct and indirect contribution of chosen variables in affecting crash risk. The studies reviewed above use the within-firm pay gap as the catalyst for price crash. Chowdhury et al. (2019), on the other hand, find that industry tournament incentives reduce the risk of price crash for a sample of U.S. firms. Such a negative association is more pronounced for firms with low information asymmetry, low financial constraints, low asset redeployability, and high financial statement comparability.

2.4.3.3 Section Summary

In this section, we reviewed the empirical literature on whether tournament incentives affect capital market consequences, including stock liquidity, cost of capital and firm-level price crash. Relevant papers are summarized in Table 2.2. Empirical evidence suggests that high within-firm tournament incentives increase corporate cash holdings and the market

valuation of such holdings; reduce the default risk; increase the cost of capital, firm acquisitiveness and acquisition risk; but reduce the announcement returns. In terms of stock price crash risk, current evidence is mixed, as Jia (2018a) finds that tournament incentives increase the occurrence of price crash in the U.S., while Chen et al. (2017a) and Sun et al. (2019) find opposite results in China. Empirical studies find that industry tournament incentives increase the cost of bank loans but decrease the likelihood of stock price crash.

Table 2.2: Consequences of tournament incentives

Author (year)	Research Question	Sample Size	Sample Justification	Tournament Measures	Alternative Controls	Findings	Economic Significance
Panel A: Tournament incentives, financial reporting quality and audit outcomes							
Haß et al. (2015)	Tournament and corporate fraud	U.S.:16,052 observations during 1994 to 2004	Yes	Ln (total CEO compensation – median value of total VP compensation)	Controlled for equity incentives of CEOs by including option intensity. Controlled for CEO power by including CPS	Tournament incentives increase the likelihood of corporate fraud even after controlling for the potential effect of corporate governance and CEO power	A 100% increase in pay gap leads to a 0.14% increase in the possibility of being fraudulent for the average company.
Park et al. (2017)	Tournament incentives and earnings management	U.S.: 12,462 firm-year observations during 1994 to 2013	No	The ratio of the CEO's compensation to the median TMT executive's compensation	Controlled for CEO alignment and risk-taking incentives by constructing the CEO's total portfolio delta and vega. Used CEO power as the moderator variable	Firms with larger pay disparities in the TMT exhibit more real earnings management (REM), and the positive relation is driven by short-term compensation. This positive relation is weaker for firms in homogeneous industries, while it is stronger for firms with CEO turnover in subsequent years.	No
Zhang et al. (2018)	Tournament incentives and financial restatements	China: 16,234 firm-year observations during 2008 to 2015	Yes	The difference between the mean of the top 3 executives' compensation and the mean of the remaining executives' compensation (LnGAP)	A low compensation sample (observations < COMPEN median) and a high compensation sample (observations > COMPEN median) is created. No significant difference with respect to financial	Tournament incentives reduce the occurrence of both core and non-core financial restatements. This negative association is more pronounced for SOEs as compared to non-SOEs and if the successor CEO is recruited from within the organization	A 1% change in LnGAP decreases the likelihood of financial restatements by 1.8%

					restatements is found.		
Jia (2017)	Tournament incentives and audit fees	U.S.:10,527 observations during 2000 to 2013	Yes	Log (CEO-Median VP Pay); Log (CEO-CFO Pay)	Controlled for CEO power by including the G-index	Tournament incentives are positively associated with audit fees. The association is attenuated for firms with a recent CEO turnover, in industries in which outside succession is more likely, and for family firms. But the association is accentuated, when firms have large abnormal accruals or are experiencing poor performance and when the CEO nears retirement	Firms with pay gaps in the 75th percentile pay audit fees that are, on average, 12 percent higher than the audit fees of firms with pay gaps in the 25th percentile
Bryan & Mason (2017)	Tournament incentives and audit fees	U.S.: 8,604 observations during 2004 to 2014	Yes	(i) The natural logarithm of the mean and median total compensation of the top five highest paid executives and (ii) the total compensation of the CFO	No	Tournament incentives are positively associated with audit fees. The positive association is moderated by insider CEO succession, CEO tenure, CEO age, auditor tenure, and abnormal accruals	An increase from the median to the 75th percentile of pay gap is associated with a 3.90% increase in audit fees
Panel B: Tournament incentives and firm-level operational consequences							
Firm performance							
Kale et al. (2009)	Tournament incentives and firm performance	U.S.: 17,987 firm years during 1993 to 2004	No	Log of total compensation of CEO minus the median value of total compensation of	Controlled for CEO alignment	Tournament incentives relate positively to firm performance. The relation is more pronounced when the CEO nears retirement but is less pronounced when the	No

				all VPs in the firm-year		firm has a new CEO, and weakens further when the new CEO is an outsider	
Lin et al. (2013)	Tournament incentives and firm performance	China (Taiwan): 1322 firm/year observations from 2002 to 2004	No	GAP 1=Level 1 pay−Level 2 average pay GAP 2=Level 2 average pay−Level 3 average pay. Total cash compensation	No	Tournament–performance relationships are industry-specific. For non-high-tech firms with low levels of R&D intensity, firms are encouraged to increase executive pay gaps, in order to improve firm performance. But for high-tech firms with high coordination needs, large pay gaps do not necessarily improve firm performance	No
Hu et al. (2013)	Tournament incentives and firm performance	China: 7,811 firm-year observations during 2005 to 2010	Yes	Log of difference between CEO pay and the median of other executive pay	Controlled for CEO tenure and CEO duality	Tournament incentives are associated positively with firm performance. However, the relationship is weaker where firms are controlled by the government and where the CEO is politically connected. However, the tournament-performance relationship strengthened after the China's split-share structure reforms	No

Coles et al. (2017)	Industry tournament and firm performance	U.S.: 17,702 firm-year observations during 1992 to 2005	Yes	Compensation gap between the CEO under consideration and the second highest-paid CEO in the same industry.	Controlled for CEO duality, CEO tenure, and CEO age	Industry tournament incentives are associated positively with firm performance, riskier internal investment decisions, and financial policy. The industry tournament incentive is weaker for new CEOs and retiring CEOs, but stronger in homogenous industries and when the CEO's past stock performance is above the industry median	A one standard deviation increase in industry tournament gap increases Tobin's Q by 0.38
Firm risk and innovation							
Kini & Williams (2012)	Executives' tournament and firm risk	U.S.: 14,542 observations from1994–2009	No	The difference between the CEO's total compensation and the median VP's total compensation package	Controlled for CEO alignment and risk-taking incentives	A significantly positive relation between firm risk and tournament incentives is documented. Further, greater tournament incentives lead to higher R&D intensity, firm focus, and leverage, but lower capital expenditure intensity	A one standard deviation increases in Pay gap around its mean results in1.44 standard deviations increase in Cash flow volatility (proxy for firm risk)
Shen & Zhang (2016)	Executives' tournament and firm innovation	Using a large sample of U.S. public firms over the period 1993–2003	No	Pay Gap is defined as the difference between the total compensation of the CEO and that of the median VP in the firm	Controlled for equity incentives	Tournament incentives are positively related to innovative efficiency (number of approved patents and patent citations), and is found to be particularly pronounced during the period prior to CEO turnover	A 10.6% increase in innovation efficiency can lead to $13.51 million increase in market value
Tax avoidance							

Kubick & Masli (2016)	Tournament incentives and tax aggressiveness	U.S.: over 13,000 firm-year observations spanning fiscal years 1994–2012	Yes	The gap between the CEO's total compensation and the CFO's total compensation	Controlled for equity incentives	Tournament incentives of the CFOs are associated positively with greater tax aggressiveness: findings consistent with the prediction that such strategies can produce positive outcomes	No
Kubick & Lockhart (2016)	Industry tournament and tax aggressiveness	U.S.: 16,150 observations spanning fiscal years 1994 through 2012	Yes	The ratio of CEO compensation to the second highest-paid CEO for that industry size peer group	Controlled for CEO equity incentives	Industry tournament incentives motivate CEOs to adopt more aggressive tax policies in order to improve firm performance and their own labour market value. This relation is attenuated in industries for which the CEO has fewer outside employment options, but is amplified in industries for which competition for CEO talent is likely to be greatest, and also among CEOs estimated to have greater ability	A one-standard deviation increases in the log of the industry pay gap is associated with a 1.4% lower GAAP effective tax rate relative to industry-size peer firms
Managerial turnover							
Kale et al. (2014)	Tournament incentives and VP turnover	U.S.: 19,598 VP-year observations over the period 1993–2004	No	Difference between the compensation of the firm's CEO and the median VP in the firm	No	Managers are more likely to resign when their pay relative to their peers in the firm and outside the firm is lower; and firms with greater levels of pay inequality and greater pay inequality relative to benchmark firms experience higher VP turnover	The estimated coefficient on Log (CEO–VP pay Gap) of 0.105 suggests that a unit increase in this variable translates into an increase in the resignation probability of 2.93%
Other firm operational consequences							

Hart et al. (2005)	Tournament and Corporate social performance (CSP)	U.S.: 13,464 observations during 1996-2011 sample period	Yes	The log of the difference between the compensation of the CEO and the average compensation of the rest of the TMT members	Controlled for CEO duality and CEO tenure	The CSP is higher in low pay disparity firms (stakeholder-centric orientation) than in high pay disparity firms (CSP as an opportunistic tool).	No
Shi et al. (2016)	Tournament incentives and corporate lawsuits	U.S.: a sample of 1,929 firms over 1996 to 2012	Yes	The difference between the CEO's pay and the average pay of the other four highest-paid members of the TMT	No	The pay gap is positively associated with securities class action lawsuits stemming from managerial proclivities to engage in wrongdoing to reap maximum rewards. However, the relationship is wakened for firms operating in high uncertain environment.	No
Panel C: Capital market consequences							
Stock liquidity and debt contracting							
Huang et al. (2019)	Industry tournament incentives and corporate liquidity	U.S.: 27,204 firm-year observations during 1992 to 2014	Yes	The pay gap between the firm's CEO and the second highest-paid CEO in the same industry	CEO equity incentives	Industry tournament incentives (ITIs) increase the level and marginal value of cash holdings. Furthermore, ITIs strengthen the relation between excess cash and market-share gains, especially for firms that face significant competitive threats. Additionally, for firms with excess cash, higher ITIs lead to increased R&D expenses, capital expenditures, and spending	Cash holdings are, on average, 5.84% to 11.16% higher for high-ITI firms than for low-ITI firms

						on focused acquisitions as well as reduced payouts	
Phan et al. (2017)	Tournament incentives and corporate cash holdings	U.S.: 25,028 firm-year observations spanning 1992 to 2014	Yes	The natural logarithm of the difference between a CEO's total compensation and the median total compensation of the next layer of senior managers	Controlled for CEO delta and CEO vega	Tournament-based incentives are related to cash holdings and the value of cash positively. The effect is stronger for financially constrained firms. CEO pay gap exhibits a more pronounced effect during the period of high tournament likelihood but an insignificant effect when the tournament likelihood is low	A one standard deviation increases in CEO pay gap centred on its sample mean increases the value of a dollar of cash by $0.16 to shareholders of an average company
Stock price crash risk							
Chen et al. (2017)	Executive political promotion and stock price crash risk	China: 5,590 SOEs 2,835 NSOE observations during 2005-2012	No	Political rank	No	The political promotion is related to firm stock price crash risk negatively. This association exists mainly in firms with younger managers and managers with shorter tenure. Further, this effect is significant only in regions with weak market forces, in firms without foreign investors, or without political connections or managers' political promotions	No

Jia (2018)	Tournament incentives and stock price crash risk	U.S.: 25,571 observations from 1992-2014 period	Yes	The natural logarithm of the difference between CEO compensation and mean and median VP pay	Controlled for managerial power by including G-index	A significantly positive association between pay gap and future stock price crash risk is documented. However, firms that experience a decrease in pay gap as a result of the Say-on-Pay law, experience a greater drop in crash risk than do firms unaffected by this law. Also, the positive association is more pronounced for high opacity firms, but is insignificant for low opacity firms	A one standard deviation in increase in pay gap in year t is associated with an increase of 0.014 in NCSKEW in the following year
Sun et al. (2019)	Tournament incentives and stock price crash risk	China; 10,486 observations during 2006-2017	Yes	Average pay gap between the top three executives and the remaining executives.	Controlled for CEO duality as a proxy of CEO power	Tournament incentives are associated with firms' stock price crash risk negatively and significantly. The negative relationship between tournament incentives and price crash is significant for the non-SOEs only. Conditional conservatism mediates the negative association between tournament incentives and price crash	A one standard deviation increase in pay gap in year t, is associated with 5.14 and 4.04% decreases in NCSKEW and DUVOL, respectively, in the following year

2.5 An agenda for future research on tournament incentives

2.5.1 Firm- versus industry-level tournament incentives

Both firm-level and industry-level tournament incentives are aimed at motivating the top management team to work towards maximizing firm value. However, there are several key differences between these two types of tournament incentive. First is the incentive target. Firm-level tournament incentives are internal promotion incentives for top executives. In contrast, industry-level tournament incentives are external promotion incentives, which provide CEOs promotion opportunities outside the firm, but within the same industry. Second, the measurement of the two types is different. Firm-level tournament incentives are proxied by the compensation gap between the CEO and remaining executives within the firm, whilst industry-level tournament incentives are measured by the compensation difference between a firm's CEO and the highest-paid CEOs within the group of firms operating in the same industry. Third, in the firm-level tournament setting, senior executives are primarily concerned about outperforming their peers in the internal promotion contest. In the industry tournament setting, CEOs try to outperform other CEOs within the same industry, by building a long-term personal reputation in the external labour market. Last but not least, the effectiveness of these two tournament incentives depends on different circumstances. For example, Jia (2018a) documents that firm-level tournament incentives increase the occurrence of stock price crash in the U.S., owing to an increased propensity for managerial misreporting. In contrast, Chowdhury et al. (2019) find that industry tournament incentives reduce the risk of price crash in the U.S., as CEOs tend to build long-term reputations in the external labour market by ensuring fair disclosure and timely reporting of negative news. Another example is related to firm credit risk and liquidity. Du et al. (2019) suggest that within-firm tournament incentives

help reduce credit risk, but Kubick et al. (2018) find that industry tournament incentives lower credit ratings and increase the cost of bank loans.

The mixed evidence reported above has implications for future studies. It raises the question of which type of incentive is more suitable for investigating specific outcomes (e.g., audit fees). We encourage future researchers to justify their preference for one type of tournament incentive over another, and to control for the confounding effect, if any, of the alternative tournament structure, in order to enrich their findings (Kubick et al., 2018). Coles et al. (2017) show that the effect of industry tournament incentives on corporate risk, and on the investment and financing channels that drive corporate risk, is economically much more significant than are firm-level tournament incentives.

2.5.2 Future research on tournament incentives in the Asia region

This section discusses three key institutional differences between developed and developing markets and offers some potential research paths for tournament incentives in the Asia region and Gulf Cooperation Council (GCC) countries. We call for more research on tournament incentives in these countries because institutional differences have significant implications for the effectiveness of tournament incentive schemes.

First, the compensation structure in the Asia region is very different from that in the U.S. and other continents. The compensation arrangement in this region is a mixture of the following elements: dominance of cash-based compensation, excessive amounts of political/other perks, and the emergence of equity incentives. Unlike executive compensation in the U.S., that in China, Japan, and Korea is predominantly cash-based (Kato et al., 2007; Li et al., 2013; Shuto, 2007). Such a compensation structure has been found to differ in its implications for financial reporting quality and capital markets. For instance, Jia (2018a) documents that tournament incentives lead to a higher stock price crash risk in the U.S.: a

country characterized by the dominance of equity-based compensation schemes for the listed firms. Sun et al. (2019), on the other hand, find the opposite for China where cash compensation is the norm. Moreover, the magnitude of the compensation gap in Chinese listed firms is much smaller than that in Western firms[12], which often results in a smaller tournament size. The differences in tournament size may be explained by China's unique collective culture and its pursuit of internal harmony (Hofstede, 2001). Whether such variations in tournament size have positive or negative consequences for firm performance and firm risk is worth further exploration (Burns et al., 2017).

In the Asia region, political promotions and excessive perks are widely observed phenomena at the senior executive level. For example, Thomas (2008) compares executive perks between the U.S. and Indian firms and finds that perks occupied only a relatively small portion of the U.S. executive remuneration, whereas they account for 33% of the total remuneration of executives in India. Moreover, Xu et al. (2014) and Chen et al. (2017a) document a constraining effect of political perks on stock price crash risk in China. We, therefore, posit that these perks may cause tournament incentives to work differently in the Asia region. For instance, it is unclear whether the use of perk compensation would be detrimental to the effectiveness of tournament incentives in that region, since managerial perks may work as an incentive mechanism that encourages better managerial performance and higher productivity (Adithipyangkul et al., 2010).

Although cash compensation remains dominant in Asia countries, equity-incentives-based compensation schemes have started to gain popularity. However, only a handful of studies have investigated the adoption of long-term incentive plans, such as stock options for listed firms, in this region. For example, using a group of Japanese firms, Kato et al. (2005)

[12] Main et al. (1993) report that promotion from level 2 to level 1 leads to an average cash remuneration increase of 140% in the U.S. The corresponding figure is 60% in the UK, as shown by Conyon et al. (2001). However, executive remuneration increases by only around 20% in the Chinese market.

find that firms' growth opportunities are positively related to managerial long-term incentives plans, while firms with high leverage are less likely to adopt such plans. The Chinese government also introduced equity-based compensation plans in 2006 (He & Conyon, 2012; Li et al., 2013)[13], although comprehensive regulations and guidance around the use of equity-incentive plans has become evident only since 2016. It would be interesting to explore the implications of equity-incentives on tournament-based compensation schemes in this region. We suggest that future research could investigate how tournament incentives would work for the first-time adopters of options-based compensation plans.

Second, state ownership remains a dominant feature in many Asia countries, including China, India, Indonesia, Korea, Malaysia, Singapore, and Thailand. (Boubakri et al., 2004; Claessens et al., 2000; Hossain et al., 2013). Some of the existing tournament studies in the Chinese context examine the moderating effect of state ownership. Furthermore, state ownership in China can be further classified as state-level ownership, provincial-level ownership and city-level ownership (Firth et al., 2006). It would be interesting for future research to explore whether this differentiated state ownership has a bearing on the existence and consequences of corporate tournament incentives.

Third, many of the listed firms in the Asia region are characterized by the dominance of family-controlled firms, which might have implications for the existence and effectiveness of tournament structures. For example, the majority of listed firms in Hong Kong are controlled by families, and their directors or executives are also family members (Ho et al., 2004). Prabowo and Simpson (2011) state that, in Indonesia, the ownership of listed companies is concentrated in the hands of a few families. Minichilli et al. (2010) find that the presence of a

[13] The stock-based compensation plan was introduced in China when the Ministry of Finance (MOF) and the State-owned Assets Supervision and Administration Commission (SASAC) published an Equity Incentive Guideline for Listed Companies (Trial Version) on 1 January 2006. In the following year, the SASAC circulated a supplementary regulation that required the disclosure of executive equity incentives, and this version was replaced by the updated official guideline launched in 2016 that required more detailed disclosure of stock-based incentive plans (Zhang et al., 2018).

family CEO combined with the presence of family members on the top management team is perceived by the non-family top executives as a negative signal of their chances for promotion in the U.S. market. However, Xu et al. (2019) find that ownership concentration of the largest family owner relative to other family members is positively associated with the use of non-family executives in a family-controlled firm in China. Hence, it remains to be seen how such differences might affect tournament incentives in the Asia region.

Following the same vein, we also call for future research on the determinants and consequences of tournament incentives for GCC countries. GCC countries share many of the common institutional features found in many Asia countries. For instance, executives are compensated mainly by cash salary and bonuses in the GCC countries. The government has a strong influence on most of the large listed firms, since these are entirely or partially owned, controlled, and financially supported by governments (Agha & Eulaiwi, 2019). Moreover, firms are characterized by a unique feature of royal family ownership, as approximately 60% of the listed firms are dominated by firms with royal family members on the board of directors (Al-Hadi et al., 2017). Hence, future studies could explore whether these unique institutional features influence the adoption of tournament incentives in the GCC countries, and whether such adoption affects the corporate outcomes reviewed in section 2.4 above.

2.5.3 Methodologic issues

In this section, we discuss some methodological issues that may challenge the findings from the current body of tournament research in accounting and finance. First, despite using the same measurement of pay gap (i.e. the pay gap between the CEO and the top three or five highest-paid executives), some studies explain their findings using alternative theoretical perspectives. For example, the determinants of within-firm pay gap, including pay gap between executives and employees, and different levels of employees, have been explained using social

comparison theory, managerial power theory, equity fairness theory and/or productivity theory. In terms of firm performance, Kale et al. (2009) suggest that the positive relationship between the pay gap and firm performance is consistent with the predictions of tournament theory. However, Tarkovska (2017) explains the negative association between pay gap and firm performance by employing social comparison theory. Indeed, it cannot be denied that the pay gap story can be well explained by other theoretical perspectives: however, stronger justifications need to be provided to favour one theory over another, and these are currently missing from the empirical literature.

Managerial power theory is one of the most viable alternatives to the tournament theory. The CEO pay slice measure, which is the same as the tournament measure, has been proposed by Bebchuk et al. (2011), who argue that their measure captures CEO power over the management team. Hence, a large pay slice indicates an entrenched CEO, who may cause a severe agency problem, and obstruct succession planning to further entrench himself. For example, Chen et al. (2013) use both tournament theory and managerial power theory to explore the effect of pay gap on the cost of capital. They document a negative relationship between the pay gap and cost of capital: a finding they argue to be consistent with managerial power theory. Our review revealed that many studies have considered the presence of this confounding effect and controlled for 'CEO power' in their empirical models. However, some studies fail to do so (Bryan & Mason, 2017; Kubick & Masli, 2016; Lin et al., 2013). Hence, future tournament studies should control adequately for the impact of CEO power in their empirical tests, in order to provide robust evidence on why tournament theory is superior to other related theories.

Second, as highlighted in our review, most of the empirical papers on the determinants and consequences of pay gap have used the compensation gap between the CEO and rest of the senior executives. This measurement can correctly reflect the assumption that, the larger the

pay difference, the greater the tournament incentives. However, since researchers in accounting and finance rely on machine-readable data to calculate the pay gap, the empirical tests do not contain information about whether an insider has been promoted, because most companies do not announce their promotion method and the executives being considered for promotion. This concern is valid because, if a firm has a designated heir, the use of compensation gap between CEO and executives to capture the promotion incentives is less meaningful (Mobbs & Raheja, 2012). Hence, they encourage future studies to distinguish whether firms are using 'tournament contests', whereby multiple candidates are competing for the CEO position, or 'successor contests', whereby a single manager is being groomed for succession. There have been some studies, such as Kale et al. (2009), Kini and Williams (2012) and Jia (2017) who consider the 'successor plan' as a moderating variable, but this is not what Mobbs and Raheja (2012) proposed.

Furthermore, Mobbs and Raheja (2012) point to the amount of firm-specific human capital, and the availability of external candidates, as two critical factors affecting decisions on the adoption of possible promotion plans (tournament or selection of an heir). They note:

> "First, when firm-specific human capital is of greater importance for the CEO…firms opt for a prolonged grooming period to allow the potential successor time to work with the incumbent CEO. Second, when there is greater availability of qualified external candidates, firms maintain tournament-incentive promotions rather than grooming one executive. Thus, the optimal executive promotion structure varies across firms and industries based on the importance of firm-specific human capital and the supply of qualified CEOs." (p.1347)

Therefore, future research should take this perspective into consideration in measuring tournament incentives.

Third, since accounting and finance researchers employ, predominantly, some form of regression technique to explore the determinants and consequences of pay gap, some econometric concerns inevitably arise. Endogeneity concerns inherent in the regression analyses is one such serious concern. There are two circumstances that could make the pay gap endogenous. The first potential endogeneity issue is omitted variables bias, as the omitted

variable could drive both pay gap and the outcome measures examined by the researchers. Even after controlling for several known CEO characteristics and firm characteristics, there may still be unobservable firm or CEO heterogeneity correlated with both the pay gap and outcome variables, thereby, biasing the reported results. The other potential endogeneity concern could stem from reverse causality, whereby the outcome variable could determine the pay gap, or the causality could run both ways. If the outcome variable affects the pay gap variable, the latter will be correlated with the error term, which will generate a biased coefficient on the pay gap variable.

Most empirical studies attempt to mitigate the aforementioned endogeneity concerns by conducting a battery of robustness analyses including the use of different proxies for tournament incentives; lagged independent variables, firm fixed effects regressions, the propensity-score matching technique, the two-stage least squares (2SLS) analysis, and the generalized method of moments (GMM) technique for dynamic models. However, since these tests have inherent limitations (e.g., finding suitable instruments for the 2SLS analysis), it is important to acknowledge that current studies can never fully eliminate the possibility that empirical evidence could be affected by endogeneity bias.

2.6 Conclusion

In this literature review, we reviewed and discussed the empirical literature on the determinants and consequences of tournament incentives. Tournament incentives encourage non-CEO executives to work harder and better align their interest with shareholders. This theme has been the primary focus of the current literature on tournament incentives; whereas the opponents to tournament incentives, find executives engaging in unethical activities to enhance their promotion probability. Because of the competing arguments, future research could consider the possible mechanisms/channels through which tournament incentives

influence managerial behaviours. Financial reporting quality and risk-taking have been identified as main mechanisms through which tournaments affect firm-level operation and the capital market. However, excepting Sun et al. (2019), who tested the mediating effect of financial reporting quality empirically, none of the other studies examines whether either reporting quality or risk-taking operate as channels at the empirical level.

In terms of the country coverage of existing tournament research, it is not surprising that the United States dominates the empirical research, followed by China. Although there are a couple of international studies based on single countries, that type of study is rare compared with those using the western setting. The institutional environment of some of the emerging economies is quite different from that of their developed economy counterparts. Therefore, we call for more international studies advancing our understanding of the influence of country-specific distinctive features on the determinants and consequences of tournament incentives. In addition, we find no published study on the consequences of tournament incentives using cross-country data. Cross-country studies may offer better insights into the role of tournament incentives and provide more generalizable results than the mixed findings from single-country studies.

CHAPTER THREE - BUSINESS STRATEGY, TOURNAMENT INCENTIVES AND FIRM PERFORMANCE: EVIDENCE FROM CHINA (ESSAY TWO)

3.1 Introduction

This essay investigates the association between business strategy and firm-level tournament incentives in China. Business strategy is an important factor affecting the internal governance mechanism of firms (Ittner et al., 1997; Miles & Snow, 1978, 2003; Varadarajan & Clark, 1994). Since a firm's business strategy is sticky, and changing the strategy requires considerable changes to the way a firm conducts its business in achieving its goals (Hambrick 1983; Snow & Hambrick 1980), it is imperative to understand business strategy-induced incentive mechanisms: tournament incentives, in our setting. A well-designed incentive mechanism allows executives to understand the importance of achieving firm objectives and encourage them to work hard towards achieving corporate targets, since their remuneration is tied to achieving some measurable targets. Considering the potential instability caused by competitive strategies, how to treat and motivate executives appropriately through accurate performance evaluation becomes increasingly important (Balkin & Gomez‐Mejia, 1990). Tournament incentives could be one such incentive mechanism, as espoused by the tournament theory (Bloom & Michel, 2002; Lazear & Rosen, 1981).

Tournament incentives facilitate a contest among senior executives, and only the best relative performer in the contest can get the generous monetary rewards as well as a superior position in the corporate hierarchy (Bognanno, 2001; Eriksson, 1999; Lazear & Rosen, 1981). Tournament incentives evaluate executives on how well one does against the other competing executives (Lazear, 1995). We posit a positive relationship between business strategy and the adoption of tournament incentives. Our study follows Miles and Snow's (1978, 2003)

organizational strategy typology, in which they identify three recurring viable business strategies namely *Prospectors*, *Defenders*, and *Analysers*. The key dimension of this typology is the magnitude and frequency with which an organization changes its markets or products (Hambrick, 1983). Prospectors and defenders are positioned at two ends of a continuum, whereas Analysers sit in the middle.

Prospectors attempt to be innovative market leaders by rapidly changing product lines and stimulating and exploring new market opportunities. The rapid growth experienced by prospector-type firms leads to complexity of operations (Habib & Hasan, 2019; Miles & Snow, 1978, 2003). To deal with such complexities, Miles and Snow (1984) suggest that prospectors' managerial recruitment strategy will be to employ highly talented executives who will outperform their peers in the industry. As more executives join in, leading to a larger internal candidate pool, prospector-type firms are likely to enlarge the tournament prize to compensate for the *lower* likelihood of promotion to the CEO position (Holmstrom, 1992; Lazear & Rosen, 1981; McLaughlin, 1988). In contrast, defender-type firms focus on production efficiency and cost control. They offer less managerial discretion by enforcing strict guidelines on investment approval, to reduce risk-taking. Defenders, therefore, are less likely to adopt tournament incentives to compensate executives, as such firms are less concerned about executives' ability to manage their strategic initiatives.

The use of a Chinese setting provides several advantages for testing the association between business strategies and tournament incentives. First, the increase in labour cost and the intensive competition globally, encourage the majority of Chinese enterprises to transit from a more *cost-oriented* business strategy to a more *differentiation-oriented* strategy. In recent decades, China has gone through a big boom of e-commerce: for instance, the widespread use of the Internet and mobile shopping platforms, all over China. The unique features of differentiation strategy, like brand name recognition, have become a crucial factor

for firms' success in a digital world. As a result, an increasing number of firms tend to adopt the differentiation strategy (Peng et al., 2015). How such a change in business strategy influences tournament incentives is a pressing research question. Second, several studies document the effect of business strategy on equity compensation in the U.S., where equity-based compensation schemes dominate (Chen & Jermias, 2014; Navissi et al., 2017). Unlike U.S. executives, Chinese executives receive predominantly cash-based compensation (i.e. cash salary, bonus and perks) (Chen et al., 2011; Huang & Boateng, 2017; Zhang et al., 2018). The relationship between such cash compensation-based tournament incentives and business strategies requires empirical scrutiny. On one hand, compared with defender-type firms, we expect prospector-type firms to design a tournament structure that widens the pay gap among executives and the CEO, because such cash and perk consumption is valuable. On the other hand, with half of the listed firms being state-owned, it is yet unclear whether state ownership would have any significant implication for the design of tournament structure in prospector-type versus defender-type firms in China.

Over 50 percent of firms that are listed on the Chinese stock exchanges are state-owned enterprises (SOEs) at the central, provincial, or municipal level (Hass et al., 2016). The strong government influence has significant implications for business strategies pursued by Chinese listed firms. In recent decades, the major reforms of SOEs[14] has enabled such firms to better integrate into the market economy system, and to improve their corporate effectiveness and efficiency constantly in order to respond to intensive competition from private companies and multinational companies. Following this logic, Zhao (2010) finds that SOEs tend to be more diversified as compared to their non-SOE counterparts. However, this relation is observed only for local state-owned firms (Zhang & Li, 2006). So far, there is very limited and mixed

[14] SOE reform in China has gone through a series of developments since the 1970s (Lin et al., 2020). The aim of these reforms has been to transform SOEs into modern corporations by promoting mixed ownership, recruiting professional managers, establishing corporate boards, and authorizing them to make market decisions (Supreme People's Court, 2013; State Council, 2015).

evidence on the effect of different types of state ownership on the association between firm-level strategies and tournament incentives. We conduct empirical analysis to further explore this issue.

Using a large sample of non-financial Chinese listed firms in the A-share market during the period from 2011 to 2017, we find that firms pursuing prospector strategy have larger tournament sizes compared with defender-type firms. In terms of economic significance, the reported coefficient implies that a one standard deviation increase in *STRATEGY*, is associated with an 11.37 percent increase in tournament incentives (proxied by *LnGAP*). The main findings are robust to alternative measures of tournament incentives and firm fixed effects. To deal with the endogeneity issues that can arise from omitted variables, reverse causality, or model misspecification problems, we also conduct propensity score matching (PSM) tests and find results that are consistent with the main results. We further test the moderating effects of tournament incentives on the business strategy and firm performance relationship empirically and provide some evidence that innovative firms offering larger tournament prizes to their executives tend to have better future performances. Finally, we test for the moderating effect of state ownership on the association between business strategy and tournament incentives, and find the association is positive and significant for both the SOE and non-SOE sub-samples. However, when the SOE sample is decomposed into central and local-SOEs we find the positive association to be confined to the local-SOE group, but *insignificant* for the central-SOE group.

Our study contributes to the existing literature in several important aspects. First, we extend the scant literature on the *determinants* of tournament incentives by investigating the role of firm-level business strategy. Prior studies document that firm growth pattern (Sahib et al., 2018); CEO characteristics (Vitanova, 2018) and cultural values, including power distance and pay equity (Burns et al., 2017), affect the level and structure of corporate tournaments.

However, to the best of our knowledge, no study has yet explored the relation between business strategy and tournament incentives, which is rather surprising, given the dominant role business strategies play in shaping corporate decisions. Jiang et al. (2019) examine the effect of chairperson collectivism on pay disparity between executives and employees in China. However, unlike Jiang et al. (2019), we focus on tournament incentives at the top management level and incorporate business strategies formulated at the executive level as the primary catalyst for the existence of tournament incentives in China. Second, our findings have policy implications for regulators regarding the appropriate design of managerial compensation for the SOEs. Our findings suggest that only the *local SOEs'* tournament incentives are sensitive to business strategy, hence, "Pay Cap"[15] policy may not fit for all types of SOE. The policy may be more suitable for central SOEs and defender-type local SOEs since these firms are less innovative, and do not necessarily need a large pay disparity to compensate their executives. Third, the positive effect of tournament incentives on firm performance for firms pursuing innovative strategies, provides practical implications for corporate boards.

The rest of the essay is organized as follows. Section 3.2 reviews the literature on business strategy and tournament incentives and develops the hypotheses. Section 3.3 explains the Sample selection and research design issues. Descriptive statistics and discussion on main empirical results are reported in Section 3.4, and Section 3.5 concludes the essay.

3.2 Literature review and Hypotheses development

3.2.1 Research on business strategy

Business strategy is a set of proactive actions and moves that assist a firm in achieving and sustaining a competitive advantage within an industry (Varadarajan & Clark, 1994).

[15] "Pay cap" policy aims to reduce the compensation difference between the average cash compensation of executives and average annual salary of employees from a ratio of 12:1 to 7:1 or 8:1 for the SOEs (State Council, 2014).

Considering the differences in the magnitude and direction of change in various firms' products and markets within the same industry, Miles and Snow (1978, 2003)[16] categorize business strategy into three types: prospectors, analysers, and defenders. Bentley et al. (2013) construct a composite strategy measure to proxy for an organization's business strategy. This measure has been used extensively in contemporary empirical strategy literature (Bentley et al., 2013; Bentley-Goode et al. 2017, 2019; Chen et al., 2017c; Habib & Hasan, 2017, 2019; Higgins et al. 2015). Prospectors (innovation-oriented strategy) are innovative companies that concentrate on seeking new products and identifying potential market opportunities which require them to make substantial investments in R&D and marketing activities. In order to respond quickly to changes in markets conditions, prospectors tend to maintain a more flexible organizational structure and to offer greater managerial discretion for coping with uncertainties. Unlike prospectors, defenders consider mainly how to obtain a competitive advantage on their products, service and quantity, through more efficient production and distribution in a single market. Therefore, defenders maintain a more centralized organizational structure to control operating costs (Miles & Snow, 1978; Thomas & Ramaswamy, 1996). Analysers, the remaining strategy group, exhibit characteristics of both prospectors and defenders.

Several studies have shown the effects of business strategies on firm outcomes and managerial behaviour. Compared to defenders, prospectors are more likely to engage in financial reporting irregularities (Bentley et al., 2013), experience weaker internal control (Bentley et al., 2017), adopt more aggressive tax avoidance strategies (Higgins et al., 2015), have a high probability of receiving a going concern opinion (Lim et al., 2018), provide less readable annual reports (Chen et al., 2017c; Habib & Hasan, 2017), exhibit inefficient

[16] According Miles and Snow (1978), reactor is the fourth type of strategy. "*The Reactor is a form of strategic "failure" in that inconsistencies exist among its strategy, technology, structure, and process*." We did not include the reactor in our study because reactors will become one of the above mentioned strategies in the future, unless firms exists in a "protected" environment, for instance, a monopolistic or highly-regulated industry, it unlikely to act as a Reactor indefinitely (Miles and Snow, 1978).

investments (Habib & Hasan, 2019; Navissi et al., 2017), make more profitable insider trading (Chen & Keung, 2019). On the other hand, Bentley et al. (2019) find that prospectors exhibit lower information asymmetries than defenders, as prospectors tend to have greater analyst and press coverage, and more frequent voluntary disclosures. Following the same vein, Yuan et al. (2018) find that prospectors produce a better CRS performance than defenders.

In terms of executive compensation, Veliyath et al. (1994) find that prospectors pay their top executive team more than their defender or analyser counterparts, since the executives of prospector-type firms face more employment risks, as proxied by the annual variance of quarterly sales. Using high-technology industries, Yanadori and Marler (2006) find that prospectors tend to pay higher salaries for their R&D employees. Chen and Jermias (2014) find that product differentiation firms use a higher proportion of performance-based compensation (bonus, stock options and other annual compensation) for their managers, than do cost-leadership firms. However, how business strategy influences on another type of incentive plan, namely, tournament incentives (promotion-based compensation) received far less attention.

3.2.2 Research on tournament incentives

The tournament theory was originally developed by Lazear and Rosen (1981) and then extended by Rosen (1986). The theory states that tournament incentives facilitate a contest among senior executives, and the winner of the contest can get higher remuneration and superior status in the corporate hierarchy, while the remaining competitors "lose" the tournament and receive nothing (Bognanno, 2001; Eriksson, 1999; Faravelli et al., 2015; Lazear & Rosen, 1981; Murphy, 1999). Tournament incentives, proxied by the pay gap between CEO and senior executives, serve to encourage senior executives to work hard to achieve the prize of the CEO position. Unlike explicit compensation plans where certain goals

are specified beforehand, under tournament schemes executive performance is often evaluated by comparing how well one does against the other competing executives. Thus, tournament incentives are an efficient incentive mechanism to elicit effort when managerial performance is difficult to observe. Existing evidence indicates that trade-offs do exist in using promotion-related compensation as, although incentives for agents to work harder are provided, aggressive behaviours by risk-seeking agents are, at the same time, induced. For example, prior studies have found that tournament incentives induce more sabotage activities (Harbring & Irlenbusch, 2011), more aggressive tax strategies (Kubick & Masli, 2016), and result in higher audit fees owing to increased levels of audit risk (Bryan & Mason, 2017).

3.2.3 Business strategy and tournament incentives

As mentioned before, prospector-type firms that focus on seeking new growth opportunities and rapid changes in product markets, operate businesses under an intensively competitive environment as compared with defender-type firms (Miles & Snow 1978, 2003). Such challenges encourage them to expand their top management team. Miles and Snow (1984) also suggest that prospectors' managerial recruitment strategy will be to employ highly-talented executives who will outperform their peers in the industry. This may lead to a larger internal candidate pool, who will compete for CEO promotion. When more competitors join in, there is a lower probability of getting CEO promotion and a smaller winning prize. Tournament theory suggests that a larger tournament prize is needed to compensate the lower likelihood of promotion for individual executives (Holmstrom,1992; Lazear & Rosen, 1981; McLaughlin, 1988;).

Moreover, the managerial *level* of effort tends to increase with the prize spread between the winner and the loser (Knoeber & Thurman, 1994). To ensure executives continue exerting high levels of effort, firms should enlarge their pay gap to compensate for this effect. Also, the

rapid growth experienced by prospectors increases market uncertainty stemming from complexity and risky business operations (e.g., Bentley et al., 2013; Habib & Hasan, 2019). To deal with such complexity efficiently, innovative firms might pursue higher tournament incentives, since promotion-based tournaments help to attract and retain managers owing to the intense competition among potential candidates (Lazear, 1995; Bloom & Michel, 2002). Therefore, drawing on tournament theory, it is predicted that prospector-type firms tend to have larger tournament incentives.

In contrast, defender-type firms focus on production and distribution efficiency in a narrowly defined and stable product set, instead of adjusting their product-market portfolios frequently. Therefore, they are less concerned about their executives' ability to manage firm strategic initiatives. They often have strict policies and procedures in their business operation (Navissi et al., 2017) that discourage executives from undertaking risky projects. Bentley et al. (2013) also document that defender-type firms experience lower business risks. Moreover, since they acquire growth potential from a competitive advantage on their existing range of products and services, they are less likely to experience inefficient labour investment and market uncertainty (Habib & Hasan, 2019; Singh & Agarwal, 2002). Therefore, executives in defender-type firms do not face the same level of challenges as do their counterparts in the prospector-type firms. They do not necessarily hire executives externally nor expand the top management team, as there is little demand for strategy-oriented executives in defender-type firms. In contrast with prospector-type firms, defenders are less likely to adopt tournament incentives to compensate their executives, i.e. the pay disparity among executives tends to be relatively small for defender firms. Hence, tournament theory predicts that defender-type firms are more likely to have smaller tournament incentives as compared with prospector-type firms. We, therefore, develop the following hypothesis:

H1: There is a positive relationship between business strategy and tournament incentives.

3.2.4 Business strategy, tournament incentives, and future firm performance

A natural extension of H1 would be to investigate the moderating effect of tournament incentives on the relation between business strategies and firm performance. Unlike defender-type firms, prospector-type firms are more likely to generate high potential profits through intensive investment in R&D projects (Bentley et al., 2013; Miles & Snow, 1978, 2003). However, given the uncertain and long payback nature of R&D investments (Chen & Jermias, 2014), innovators are more prone to underperforming their defender counterparts. As to the moderating role of tournament incentives on such an association between business strategies and firm performance, prior literature has provided competing arguments. The behavioural view of tournaments posits that larger pay gaps are generally *detrimental* to performance, because relative deprivation and political sabotage decrease cooperation and organizational commitment (Henderson & Fredrickson, 2001). However, the economic view of tournament incentives proposes the opposite. For instance, Main et al. (1993) show that firm performance is higher when the top management team's pay is widely dispersed. Also, professional athletes perform better when there are larger prize gaps between first and second place (Becker & Huselid, 1992; Ehrenberg & Bognanno, 1990).

An adequately designed tournament-based incentive scheme may encourage executives to work towards a better performance, thus, mitigating that negative consequence (i.e., Eriksson, 1999; Kale et al., 2009; Lin & Lu, 2009). In particular, Lin and Lu (2009) and Hu et al. (2013) find a positive effect of tournament incentives on firm performance in China, because in these firms, the CEO gets a much higher pay as compared with the remaining executives and, thereby, executives are strongly motivated to exert more effort, and to work towards a higher firm value, to attain the CEO position. Firms with innovative strategies always face challenges, as they invest heavily on R&D activities. The use of tournament incentives helps these firms to

encourage their executives to obtain the firm-specific skills needed to manage risky investments effectively, thereby, improving the firm performance.

However, other studies report the negative consequences of adopting tournament incentives, such as higher cost of capital (Chen et al., 2013), poorer firm performance (Burns et al., 2017; Carpenter & Sanders, 2004), and higher acquisition risk (Nguyen et al., 2017; To et al., 2018). Siegel and Hambrick (2005) report the harmful impact of tournaments on firm value for high-technology firms. They further emphasize the importance of cooperation among senior executives in innovative firms for firm success. Lack of cooperation is considered to be the main reason for the failure of tournament incentives in high-technology firms (Bloom, 1999). Consistently, previous studies prove that a large tournament prize may stimulate unhealthy competition among senior executives, discourage cooperation, and increase behavioural fragmentation (Pfeffer & Langton, 1993). In China, the widely used cash-based tournament incentives may induce executives to focus on achieving short-term performance and, hence, executives are more likely to enhance individual performance through uncooperative and unethical actions (i.e., dishonest and sabotage behaviour), especially for firms engaging in intensive R&D activities. Therefore, tournament incentives may exacerbate the negative effects of business strategy on firm performance. Thus, how the relationship between business strategies and firm performance varies in response to firms' tournament incentives is unclear. We, therefore, develop the following non-directional hypothesis:

***H2*:** Tournament incentives moderate the relationship between business strategies and firm performance in China.

3.3 Research design

3.3.1 Data and sample

We collected data from the China Stock Market and Accounting Research (CSMAR) database, to construct our independent variable (business strategy), dependent variable (tournament incentives), and control variables. We establish an unbalanced panel dataset of 5,705 firm-year overreactions with 1,765 unique firms in the Chinese A-share stock market (both Shang Hai and Shen Zhen Stock exchange) for the period spanning 2011–2017 with non-missing business strategy, tournament incentives and all the controls. The sample period starts from 2011 because one of the most important data sets needed for computing the strategy scores, R&D expenses, became available only from 2007 in the CSMAR database, and we require five-year data for individual components to calculate strategy scores (explained below). Our main test spans the period 2011 to 2017, and the business strategy and future firm performance analysis extends to 2018, as we use one-year-ahead changes in ROA and TOBINQ to measure firm performance.

3.3.2 Measurement of business strategy

The main variable of interest is *STRATEGY*. We compute *STRATEGY* score by using the following six firm characteristics: (i) the ratio of R&D expense to total sales (measure of a firm's propensity to seek new products); (ii) the ratio of employees to sales (firm's ability to produce and distribute its goods and services efficiently); (iii) a measure of employee fluctuations (standard deviation of total employees); (iv) the one-year sales growth rate (proxy for a firm's historical growth); (v) the ratio of marketing (selling, general, and administrative expenses) to sales (a proxy for firms' emphasis on marketing and sales); and (vi) a measure of

capital intensity (net property, plant, and equipment scaled by total assets) (designed to capture a firms' focus on production).

Consistent with previous literature (e.g., Bentley et al., 2013), all variables are computed using a rolling average over five years (including the current year). We then rank each variable within each industry-year[17]. Within each firm-year, those observations with variables in the highest quintile are assigned a score of 5, while those in the lowest quintile are assigned a score of 1 (except capital intensity, which is reversed-scored so that observations in the lowest (highest) quintile are given a score of 5 (1). Then for each firm-year, we add up the scores for each of the six variables to get the total composite score. The highest possible score that a company could receive is 30 (prospector-type) and the lowest possible score is 6 (defender-type). This continuous measure is our primary strategy variable. However, following Bentley et al. (2013, p. 802), we develop an alternative strategy measure by creating indicator variables denoted *PROSPECT* (strategy score $\geqslant$ 24), *DEFEND* (strategy score $\leqslant$ 12), and *ANALYSE* (remaining observations). This measure of business strategy score has been adopted extensively in the current empirical strategy studies (e.g. Bentley et al., 2013; Chen et al., 2017c; Habib & Hasan, 2017; Higgins et al., 2015). Refer to Appendix A for additional details.

3.3.3 Measurement of tournament incentives

Following previous Chinese studies (Liao et al., 2009; Lin & Lu, 2009; Sun et al., 2019; Zhang et al., 2018), we use the natural logarithm of the average pay gap between the top three executives and the remaining executives (*LnGAP*) to proxy for tournament incentives. In China, there is no mandatory requirement for listed firms to disclose CEO remuneration information separately. According to the definition given by the CSMAR, the top executive team includes

[17] Industries are defined using China Securities Regulatory Commission (CSRC) industry code in 2012.

the President, Vice Presidents, Secretary to the Board, and other senior executives as reported in the annual reports, excluding independent directors and supervisory board members. Besides, we also use *LnVPSTD* as an alternative proxy for tournament incentives defined as the natural logarithm of the standard deviation of the pay disparity between the total payment of top executives and the CEO (Sun et al., 2019; Zhang et al., 2018).

3.3.4 Empirical model

To investigate the impact of business strategy on tournament incentives, we use the regression models as shown below:

$$\begin{aligned} LnGAP_{i,t} = {} & \alpha_0 + \beta_1 STRATEGY_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 MTB_{i,t} + \beta_5 SGROW_{i,t} \\ & + \beta_6 ROE_{i,t} + \beta_7 DUAL_{i,t} + \beta_8 AGE_{i,t} + \beta_9 CEOHOLD_{i,t} + \beta_{10} TENURE_{i,t} \\ & + \beta_{11} CEOBRD_{i,t} + \beta_{12} BSIZE_{i,t} + \beta_{13} BIND_{i,t} \\ & + \beta_{14} MOWN_{i,t} + \beta_{15} LnGDP_{i,t} + \beta_{16} SOE_{i,t} + \beta_{17} Year_{i,t} + \beta_{18} Industry_{i,t} \\ & + \varepsilon_{i,t} \end{aligned} \quad (1)$$

Our variable of primary interest is *STRATEGY*. A positive and a significant coefficient on *STRATEGY* would support H1. We include a series of the control variables following prior literature on the determinants of tournament incentives (Burns et al., 2017; Kale et al., 2009). To control for firm-level fundamental factors, we include *SIZE*, calculated as the natural log of a firm's total assets. *LEV* is total liability divided by total assets and is expected to be associated with tournament incentives negatively (He & Fang, 2016; Jiang et al., 2019; Sun et al., 2019). *MTB* is the market value of shareholder's equity divided by the book value of shareholder's equity. *SGROW* is defined as percentage change in sales from the prior year to the current year; and *ROE* is calculated by dividing net income by shareholders' equity. We expect *SIZE*, and *ROE* to be related to tournament incentives positively as evidenced in previous studies (Burns

et al., 2017; He & Fang, 2016; Kale et al., 2009; Lin & Lu, 2009), while the sign for *MTB* and *SGROW* is unclear.

To isolate the possible confounding effect of CEO power on pay disparity, our model also includes *DUAL* (a dummy variable coded 1 if the CEO is also the chairman of the board, and zero otherwise), *AGE* (CEO's age), *CEOHOLD* (the natural logarithm of number of shares held by the CEO within the firm), *TENURE* (the natural logarithm of the number of months that the CEO has been with the firm) and *CEOBRD* (a dummy variable that equals 1 if the CEO sits on the corporate board, and 0 otherwise), which are commonly used as proxies to denote CEO power . Equation (1) further controls for the firm-level corporate governance variables, including *BSIZE* (the natural logarithm of the number of directors on the board), *BIND* (the ratio of the number of independent directors over the total number of directors on the board), and *MOWN* (the percentage of outstanding shares owned by a firm's executive). We also include a control for the effect of regional GDP (*LnGDP*) on firms' executive compensation and government ownership, i.e., *SOE* (a dummy variable coded 1 if the firm is a State-Owned Enterprise (SOE), and 0 otherwise). A list of definitions of all variables is provided in Appendix A. We also include industry and year dummies to control for industry and year fixed effects, respectively. To alleviate concerns about potential cross-sectional and time-series dependence in the data, we compute t-values based on robust standard errors clustered by firm.

3.4 Empirical results

3.4.1 Descriptive statistics and univariate results

Table 3.1 exhibits the sample distribution across industries. Industries are categorized according to the Guidance on the Industry Category of Listed Companies issued by the CSRC in 2012. The top three industries are manufacturing (77.63%), followed by construction

(2.50%), and wholesale and retail (2.48%). The industry composition of the sample firms is similar to that of all listed firms in the two Chinese stock exchanges that are dominated by the manufacturing sector.

Table 3.1: Industry distribution

Industry		N	%
A	Agriculture, forestry, animal husbandry and fishery	63	1.10%
B	Mining	126	2.20%
C	Manufacturing	4,441	77.63%
D	Industries of electric power, heat, gas and water production and supply	83	1.45%
E	Construction	143	2.50%
F	Wholesale and retail	142	2.48%
G	Transport, storage and postal service	54	0.94%
I	Information transmission, software and information technology services	408	7.13%
K	Real Estate	56	0.98%
L	Leasing and commercial services	44	0.77%
M	Scientific research and technical services	42	0.73%
N	Water conservancy, environment and public facility management	34	0.59%
R	Culture, sports and entertainment	34	0.59%
S	Diversified industries	35	0.61%
Total		5,705	100%

Panel A of Table 3.2 summarizes descriptive statistics for the regression variables. We winsorize the continuous variables at the 1% and 99% levels to reduce the possible impact of outliers. As shown in Panel A, the mean (median) value of our independent variable *STRATEGY* is 17.61 (18.00). About 8.12% of the firm-years are prospector firms (*PROSPECT*) and 12.32% are defender firms (*DEFEND*). The mean (median) value of *LnGAP* is 12.11 (12.15), with an interquartile range of 11.50 to 12.74, which is close to that found by Sun et al. (2019). The alternative tournament incentives variable, *LnVPSTD* has a mean (median) value of 11.66 (11.71), with an interquartile range of 11.06 to 12.29. In general, the distributions of these control variables are similar to the statistics documented in previous studies (e.g., Chen & Keung, 2019; Sun et al., 2019; Zhang et al., 2018).

Table 3.2: Descriptive statistics and univariate tests of differences

Panel A: Descriptive statistics						
Variable	N	Mean	STDEV	0.25	Median	0.75
LnGAP	5,705	12.11	1.00	11.50	12.15	12.74
LnVPSTD	5,414	11.66	1.01	11.06	11.71	12.29
STRATEGY	5,705	17.61	4.21	15.00	18.00	21.00
PROSPECT	5,705	0.08	0.27	0.00	0.00	0.00
DEFEND	5,705	0.12	0.33	0.00	0.00	0.00
ANALYSE	5,705	0.80	0.40	1.00	1.00	1.00
Firm-level controls						
SIZE	5,705	22.36	1.21	21.55	22.19	23.00
LEV	5,705	0.44	0.20	0.29	0.43	0.58
MTB	5,705	3.30	3.57	1.59	2.41	3.75
SGROW	5,705	0.19	0.53	-0.03	0.10	0.26
ROE	5,705	0.05	0.14	0.02	0.06	0.10
Firm-governance controls						
DUAL	5,705	0.24	0.43	0.00	0.00	0.00
AGE	5,705	49.40	6.39	45.00	50.00	53.00
CEOHOLD	5,705	7.55	7.75	0.00	8.37	15.08
TENURE	5,705	3.42	1.21	2.71	3.61	4.42
CEOBRD	5,705	0.91	0.28	1.00	1.00	1.00
BSIZE	5,705	2.15	0.20	1.95	2.20	2.20
BIND	5,705	0.37	0.06	0.33	0.33	0.43
MOWN	5,705	0.10	0.16	0.00	0.00	0.15
Provincial-level controls						
LnGDP	5,705	10.44	0.68	10.04	10.43	11.05
SOE	5,705	0.40	0.49	0.00	0.00	1.00
SOE_CENTRAL	2,310	0.42	0.49	0.00	0.00	1.00
Firm performance						
ΔROA	4,063	0.00	0.06	-0.01	0.00	0.01
ΔTOBINQ	2,937	0.12	1.02	-0.26	0.02	0.42

For firm-level controls, the average firm size (*SIZE*) in our sample is 22.36, with a mean leverage (*LEV*) ratio of 0.44, a market-to-book (*MTB*) ratio of 3.30, an average *SGROW* of 19%, and an average return on equity (*ROE*) of 5%. The mean values of the above basic control variables are similar to those found in previous studies (He & Fang, 2016; Liu et al., 2015; Sun et al., 2019; Zhang et al., 2017). About 24% of the CEOs chair the board (*DUAL*), and an average CEO is 49 years old (*AGE*). CEOs, on average, hold about 25 million shares in the company (*CEOHOLD*), and have an average tenure of 42.6 months (*TENURE*). Approximately 91% of CEOs sit on corporate boards (*CEOBRD*). Panel A of Table 3.2 also indicates that an average board consists of 9 members (*BSIZE*), and 33% of board members are independent directors (*BIND*). Besides, the top management team on average owns 73 million shares (*MOWN*) within the firm. The regional GDP data shows the average GDP across all regions in

China is 570 billion U.S. dollars (*LnGDP*). About 40.5 percent of firm-year observations are SOEs (*SOE*).

Panel B of Table 3.2 reports the univariate test of differences in mean values of the regression variables for firms pursuing different business strategies. It indicates that the mean *LnGAP* is 12.52 for the prospector group compared to 11.86 for the defender group. The difference is statistically significant (t-statistic 11.37, $p<0.01$). Also, compared to the *DEFEND* group (Mean=11.86), the *ANALYSE* group (Mean=12.11) has significantly high tournament size. These findings support the theoretical argument that firms pursuing the prospector-type (defender-type) business strategy are associated with high (low) tournament size. Panel B also shows that compared to the *DEFEND*/*ANALYSE* group, the *PROSPECT* firms have significantly lower leverage and more growth opportunities; they are located in more developed regions and are less controlled by government. Prospect-type firms also show high values for *DUAL*, *CEOHOLD*, *TENURE*, and *CEOBRD*. These statistics clearly show the importance of controlling these factors in our regression model.

Panel B: Univariate test of differences in tournament incentives and the control variables among various strategy groups

Strategy typologies	*LnGap*	*SIZE*	*LEV*	*MTB*	*SGROW*	*ROE*	*DUAL*	*AGE*	*CEOHOLD*	*TENURE*	*CEOBRD*	*BSIZE*	*BIND*	*MOWN*	*LnGDP*	*SOE*
(1) PROSPECT	12.52	22.25	0.37	3.77	0.37	0.08	0.35	48.85	12.42	3.6	0.95	2.12	0.38	0.21	10.56	0.19
(2) DEFEND	11.86	22.53	0.5	3.08	0.07	0.03	0.18	49.15	5.18	3.24	0.88	2.16	0.37	0.06	10.45	0.53
(3) ANALYSE	12.11	22.35	0.44	3.29	0.19	0.05	0.24	49.5	7.43	3.43	0.91	2.15	0.37	0.09	10.43	0.41
1 vs 2 (t-test of difference in mean)	***11.37***	***-3.98***	***-11.1***	***2.93***	***9.62***	***5.89***	***6.79***	-0.84	***16.99***	***4.83***	***3.85***	***-3.21***	1.57	***15.88***	***2.80***	***-12.5***
1 vs 3 (t-test of difference in mean)	***8.45***	-1.58	***-7.14***	***2.81***	***6.63***	***4.15***	***5.19***	***-2.07***	***13.35***	***2.89***	***2.58***	***-2.22***	1.49	***14.89***	***3.65***	***-9.43***
2 vs 3 (t-test of difference in mean)	***-6.14***	***3.71***	***7.41***	-1.48	***-5.65***	***-5.2***	***-3.65***	-1.32	***-7.3***	***-3.72***	***-2.7***	***2.17***	-0.38	***-5.83***	0.47	***6.07***

Note: This table shows the descriptive statistics for the tournament incentives, business strategy and control variables. Panel A of this table reports descriptive statistics and Panel B of this table presents univariate tests of differences in readability and the control variables among various strategy groups. Variable definitions are provided in Appendix A. Bold and italics values indicate statistical significance at $p<0.01$ and $p<0.05$

3.4.2 Correlation analysis

Table 3.3 shows the Pearson correlation matrix for the variables used in the basic regression models. *STRATEGY* is correlated positively and significantly with *LnGAP* (coefficients of 0.15, p<0.01), thereby, providing univariate support to H1. Consistent with previous studies, control variables such as *SIZE*, *SGROW* and *ROE* are correlated with *LnGAP* positively and significantly, while *LEV* is correlated negatively and significantly (Jiang et al., 2019). The correlations between *LnGAP* and most of the CEO characteristics, *DUAL*, *AGE* and *CEOHOLD* are positive and significant (coefficients =0.09, p<0.01; coefficients =0.05, p<0.01; coefficients =0.11, p<0.01) (He & Fang, 2016). *BSIZE* is correlated negatively with *LnGAP* and *BIND* is positively associated with *LnGAP* (coefficient = -0.02, p<0.10; coefficient = 0.04, p<0.01): results that are largely consistent with prior studies (Sun et al., 2019). The regional GDP is positively related to *LnGAP* as the coefficient of *LnGDP* is 0.18 (p<0.01). As expected, *SOE* is significantly and negatively related to *LnGAP* (coefficient = -0.19, p<0.01).

Table 3.3: Correlation analysis

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.LnGAP	1																
2.STRATEGY	**0.15**	1															
3.SIZE	**0.24**	**-0.07**	1														
4.LEV	-0.03**	**-0.18**	**0.46**	1													
5.MTB	**-0.05**	**0.04**	**-0.35**	**0.07**	1												
6.SGROW	**0.07**	**0.15**	**0.09**	0.02	**-0.06**	1											
7.ROE	**0.17**	**0.11**	**0.09**	**-0.15**	**-0.12**	**0.17**	1										
8.DUAL	**0.09**	**0.10**	**-0.13**	**-0.11**	0.01	0.02	0.02	1									
9.AGE	**0.05**	0.00	**0.11**	**0.05**	-0.01	-0.01	0.00	**-0.17**	1								
10.CEOHOLD	**0.11**	**0.22**	**-0.07**	**-0.17**	**-0.08**	**0.04**	**0.09**	**0.32**	0.02*	1							
11.TENURE	-0.02	**0.06**	**-0.05**	**-0.09**	-0.02	**-0.08**	**0.05**	**-0.18**	**0.20**	**0.29**	1						
12.CEOBRD	0.01	**0.05**	**0.04**	0.00	-0.03*	0.01	0.02*	**-0.17**	**0.06**	**0.14**	**0.21**	1					
13.BSIZE	-0.02*	**-0.06**	**0.24**	**0.17**	**-0.09**	0.00	0.01	**0.21**	**0.04**	**-0.09**	0.00	**0.1**	1				
14.BIND	**0.04**	**0.04**	0.02	-0.02	**0.04**	-0.01	-0.01	**-0.14**	0.02*	**0.04**	0.00	**-0.08**	**-0.51**	1			
15.MOWN	0.02	**0.22**	**-0.22**	**-0.25**	**-0.09**	**0.06**	**0.05**	**-0.23**	**-0.10**	**0.57**	**0.11**	**0.05**	**-0.17**	**0.07**	1		
16.LnGDP	**0.18**	**0.06**	**-0.06**	**-0.10**	**-0.04**	**0.04**	**0.06**	**-0.12**	**-0.05**	**0.22**	**0.08**	0.01	**-0.10**	-0.02	**0.20**	1	
17.SOE	**-0.19**	**-0.20**	**0.29**	**0.29**	**-0.05**	**-0.07**	**-0.07**	**0.29**	**0.12**	**-0.40**	**-0.12**	0.02	**0.27**	**-0.07**	**-0.48**	**-0.27**	1

Notes: Bold and italics indicate statistical significance at p<0.01; **and * indicates statistical significance at P<0.05 and p<0.10 respectively. All variables are defined in Appendix A.

3.4.3 Regression results

Panel A of Table 3.4 reports the OLS regression results for H1. The coefficient of our main variable of interest, *STRATEGY*, exhibits a positive and significant coefficient of 0.027 ($p<0.01$) in column (1), thereby supporting H1. In terms of economic significance, this reported coefficient suggests that a one standard deviation increase in *STRATEGY* (SD=4.21) increases *LnGAP* by 11.37% (=0.027*4.21). Consistent with prior studies (e.g. Burns et al., 2017; Jiang et al., 2019; Kale et al., 2009; Lin & Lu, 2009) and our prediction, we find a significantly positive coefficient for *SIZE* (coefficient = 0.315, $p<0.01$), *MTB* (coefficient =0.022, $p<0.01$) and *ROE* (coefficient =0.699, $p<0.01$), and a negative coefficient for *LEV* (coefficient = -0.541, $p<0.01$). CEO characteristics, such as *DUAL* and *AGE* are positively and significantly related to *LnGAP* (coefficient =0.096, $p<0.05$; coefficient =0.007, $p<0.05$) (He & Fang, 2016). The coefficient on *LnGDP* is positive (coefficient =0.173, $p<0.01$) whilst that on *SOE* is negative (coefficient =-0.454, $p<0.01$). The remaining control variables are related insignificantly to *LnGAP*.

Column (2) shows the coefficient on *PROSPECT* is positive and significant (coefficient =0.427, $p<0.01$) when we restrict the sample to firms consisting of PROSPECT and DEFEND firm-year observations. Column (3) shows the coefficient on *PROSPECT* is positive and significant (coefficient=0.292, $p<0.01$) when compared with ANALYSE-type firms. Finally, column (4) reports the coefficient on *DEFEND* is negative and significant (coefficient= -0.227, $p<0.01$) as compared with *ANALYSE*-type firms. The sign and significance of most of the control variables such as *SIZE*, *MTB*, *LEV*, *DUAL*, *LnGDP* and *SOE* are generally consistent with estimates in column (1). Taken together, our results in Panel A of Table 3.4 confirm that business strategy (*STRATEGY*) and prospect-type firms (*PROSPECT*), in particular, are positively related to *LnGAP*. Columns (5) to (8) report the regression results for Equation (1) using *LnVPSTD* as an alternative proxy for tournament incentives. We find the relationship between business strategy and this alternative tournament measure to be positive and significant as well

(coefficient=0.031, p<0.01 in column 5). Moreover, in columns (6) to (8), the results of sub-sample groups under two different strategies are consistent with results reported in columns (2) to (4).

In addition, we conduct firm fixed tests to account for unobservable, time invariant, firm-specific factors that may affect tournament incentives. Results are presented in Panel B of Table 3.4, and are qualitatively similar to results reported in Panel A. For example, the coefficient on *STRATEGY* is positive and significant in column (1) (coefficient=0.027, p<0.01) and in column (5) (coefficient=0.031, p<0.01). Overall, the results in panels A and B of Table 3.4 show firms with innovative strategies are more likely to enlarge tournament size as compared with defenders.

Table 3.4: The effect of business strategy on tournament incentives

Panel A: OLS baseline models

	1	2	3	4	5	6	7	8
	DV=*LnGAP*				DV=*LnVPSTD*			
	Baseline	*PROSPECT* vs. *DEFEND*	*PROSPECT* vs. *ANALYSE*	*DEFEND* vs. *ANALYSE*	Baseline	*PROSPECT* vs. *DEFEND*	*PROSPECT* vs. *ANALYSE*	*DEFEND* vs. *ANALYSE*
STRATEGY	0.027***				0.031***			
	[5.42]				[6.27]			
PROSPECT		0.427***	0.292***			0.418***	0.277***	
		[4.30]	[4.45]			[4.27]	[4.30]	
DEFEND				-0.227***				-0.255***
				[-4.03]				[-4.60]
SIZE	0.315***	0.261***	0.342***	0.302***	0.325***	0.263***	0.350***	0.317***
	[12.85]	[5.22]	[13.15]	[11.98]	[13.38]	[5.41]	[13.77]	[12.60]
LEV	-0.541***	-0.811***	-0.509***	-0.547***	-0.586***	-0.888***	-0.543***	-0.617***
	[-4.72]	[-3.52]	[-4.12]	[-4.57]	[-4.97]	[-3.62]	[-4.23]	[-5.01]
MTB	0.022***	0.028**	0.025***	0.020***	0.023***	0.031***	0.024***	0.023***
	[3.06]	[2.39]	[3.00]	[2.73]	[3.10]	[3.13]	[2.77]	[3.19]
SGROW	-0.039	0.04	-0.039	-0.047*	-0.070**	0.008	-0.071**	-0.074***
	[-1.58]	[0.62]	[-1.60]	[-1.86]	[-2.53]	[0.11]	[-2.53]	[-2.63]
ROE	0.699***	0.793***	0.691***	0.695***	0.584***	0.766***	0.568***	0.576***
	[6.05]	[3.49]	[5.50]	[5.69]	[4.89]	[3.04]	[4.43]	[4.55]
DUAL	0.096**	0.026	0.102**	0.101**	-0.139***	-0.246**	-0.123**	-0.139***
	[2.00]	[0.29]	[1.98]	[1.97]	[-2.77]	[-2.43]	[-2.33]	[-2.63]
AGE	0.007**	-0.001	0.010***	0.007**	0.003	-0.006	0.006*	0.003
	[2.35]	[-0.11]	[3.09]	[2.21]	[1.04]	[-0.92]	[1.79]	[1.00]
CEOHOLD	0.004	0.009	0.003	0.004	0.002	0.008	0.000	0.002
	[1.29]	[1.41]	[0.82]	[1.33]	[0.52]	[1.24]	[0.09]	[0.65]
TENURE	-0.068***	-0.085***	-0.065***	-0.070***	-0.065***	-0.089***	-0.061***	-0.067***
	[-5.00]	[-2.91]	[-4.52]	[-4.94]	[-4.65]	[-3.06]	[-4.00]	[-4.60]
CEOBRD	0.001	-0.072	0.026	-0.001	0.000	-0.075	0.022	0.001
	[0.02]	[-0.48]	[0.39]	[-0.02]	[0.01]	[-0.60]	[0.34]	[0.01]
BSIZE	0.002	0.13	0.006	-0.031	-0.016	0.157	-0.039	-0.03
	[0.02]	[0.51]	[0.04]	[-0.24]	[-0.12]	[0.68]	[-0.29]	[-0.23]
BIND	0.098	0.736	-0.025	0.144	0.147	1.246	-0.096	0.217
	[0.24]	[0.89]	[-0.06]	[0.34]	[0.36]	[1.59]	[-0.23]	[0.52]
MOWN	-0.620***	-0.723**	-0.570***	-0.644***	-0.502***	-0.472	-0.434***	-0.541***
	[-3.98]	[-2.53]	[-3.51]	[-3.77]	[-3.14]	[-1.63]	[-2.60]	[-3.08]
LnGDP	0.173***	0.142**	0.185***	0.172***	0.176***	0.137**	0.187***	0.177***
	[5.21]	[2.27]	[5.24]	[5.01]	[5.24]	[2.17]	[5.26]	[5.13]
SOE	-0.454***	-0.536***	-0.463***	-0.452***	-0.347***	-0.388***	-0.358***	-0.354***
	[-8.37]	[-4.31]	[-8.17]	[-8.23]	[-6.62]	[-3.32]	[-6.50]	[-6.62]
Industry	YES	YES	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES	YES	YES
Constant	2.669***	4.883***	2.275***	3.544***	2.215***	4.317***	2.017***	2.964***
	[3.89]	[3.58]	[3.18]	[5.17]	[3.28]	[3.23]	[2.85]	[4.32]
Observations	5,705	1,166	5,002	5,242	5,414	1,112	4,741	4,975
Adj. R^2	0.21	0.27	0.22	0.2	0.17	0.22	0.17	0.16

Note: This table presents the OLS regression results of the effect of business strategy on tournament incentives. The t-statistics reported in brackets are based on standard errors clustered by both firm and time. ∗, ∗∗, and ∗∗∗ indicate the different statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel B: Firm fixed effect models

	1	2	3	4	5	6	7	8
	DV=*LnGAP*				DV=*LnVPSTD*			
	Baseline	*PROSPECT* vs. *DEFEND*	*PROSPECT* vs. *ANALYSE*	*DEFEND* vs. *ANALYSE*	Baseline	*PROSPECT* vs. *DEFEND*	*PROSPECT* vs. *ANALYSE*	*DEFEND* vs. *ANALYSE*
STRATEGY	0.027***				0.031***			
	[14.71]				[18.51]			
PROSPECT		0.427***	0.292***			0.418***	0.277***	
		[6.19]	[9.98]			[8.70]	[7.25]	
DEFEND				-0.229***				-0.255***
				[-4.62]				[-7.11]
SIZE	0.315***	0.261***	0.342***	0.302***	0.325***	0.263***	0.350***	0.317***
	[17.95]	[9.72]	[17.03]	[14.97]	[26.71]	[16.68]	[22.33]	[20.57]
LEV	-0.541***	-0.811***	-0.509***	-0.547***	-0.586***	-0.888***	-0.543***	-0.617***
	[-9.00]	[-6.27]	[-8.27]	[-9.70]	[-9.49]	[-7.03]	[-8.57]	[-9.61]
MTB	0.022***	0.028***	0.025***	0.020***	0.023***	0.031***	0.024***	0.023***
	[7.88]	[5.31]	[9.14]	[5.82]	[8.35]	[6.10]	[8.59]	[7.07]
SGROW	-0.039**	0.04	-0.039**	-0.047**	-0.070***	0.008	-0.071**	-0.074**
	[-2.41]	[0.93]	[-2.22]	[-2.44]	[-3.29]	[0.22]	[-2.89]	[-2.79]
ROE	0.699***	0.793***	0.691***	0.695***	0.584***	0.766***	0.568***	0.576***
	[7.49]	[7.06]	[6.74]	[7.62]	[4.88]	[4.43]	[4.34]	[5.24]
DUAL	0.096***	0.026	0.102***	0.101***	-0.139***	-0.246**	-0.123***	-0.139***
	[5.82]	[0.36]	[4.60]	[5.43]	[-5.34]	[-2.83]	[-4.37]	[-9.59]
AGE	0.007***	-0.001	0.010***	0.007***	0.003*	-0.006**	0.006***	0.003*
	[4.46]	[-0.21]	[7.07]	[4.03]	[2.09]	[-2.53]	[4.36]	[1.82]
CEOHOLD	0.004***	0.009***	0.003*	0.004**	0.002	0.008**	0.000	0.002*
	[3.20]	[3.62]	[2.01]	[2.96]	[1.42]	[2.53]	[0.30]	[1.91]
TENURE	-0.068***	-0.085***	-0.065***	-0.070***	-0.065***	-0.089***	-0.061***	-0.067***
	[-7.55]	[-4.51]	[-8.68]	[-7.25]	[-7.80]	[-6.22]	[-8.37]	[-7.68]
CEOBRD	0.001	-0.072	0.026	-0.001	0.000	-0.075	0.022	0.001
	[0.02]	[-1.03]	[0.55]	[-0.02]	[0.01]	[-1.19]	[0.69]	[0.01]
BSIZE	0.002	0.13	0.006	-0.031	-0.016	0.157	-0.039	-0.03
	[0.03]	[1.35]	[0.07]	[-0.26]	[-0.18]	[1.76]	[-0.48]	[-0.25]
BIND	0.098	0.736	-0.025	0.144	0.147	1.246***	-0.096	0.217
	[0.32]	[1.73]	[-0.08]	[0.44]	[0.50]	[4.02]	[-0.31]	[0.65]
MOWN	-0.620***	-0.723***	-0.570***	-0.644***	-0.502***	-0.472*	-0.434***	-0.541***
	[-8.48]	[-3.18]	[-8.50]	[-9.51]	[-4.11]	[-1.83]	[-4.78]	[-4.83]
LnGDP	0.173***	0.142***	0.185***	0.172***	0.176***	0.137***	0.187***	0.177***
	[13.72]	[5.31]	[11.66]	[13.06]	[13.84]	[4.54]	[10.10]	[13.64]
SOE	-0.454***	-0.536***	-0.463***	-0.452***	-0.347***	-0.388***	-0.358***	-0.354***
	[-13.88]	[-9.38]	[-15.06]	[-14.10]	[-12.62]	[-8.51]	[-12.59]	[-13.53]
Industry	YES	YES	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES	YES	YES
Constant	2.788***	4.658***	2.440***	3.664***	2.386***	4.292***	2.217***	3.141***
	[4.73]	[7.77]	[3.46]	[5.66]	[4.72]	[11.65]	[3.38]	[5.15]
Observations	5,705	1,166	5,002	5,242	5,414	1,112	4,741	4,975
Adj. R^2	0.21	0.26	0.21	0.19	0.16	0.21	0.17	0.15

Note: This table presents the fixed effect regression results of the effect of business strategy on tournament incentives. The t -statistics reported in brackets are based on standard errors clustered by both firm and time. ∗, ∗∗, and ∗∗∗ indicate different statistical significance at the 10%, 5%, and 1% levels, respectively.

3.4.4 Endogeneity test

Our results present a positive relationship between business strategy and tournament incentives after conducting firm-fixed effect analyses to control for time-invariant factors that could drive both a firm's decision to pursue a business strategy and the corresponding design of a tournament structure. However, the sign, magnitude, and statistical significance of these estimates may be biased if firm-level business strategy is associated with the error term (e) in equation (1) (Woolridge, 2002). To control for endogeneity that arises from observable, rather than unobservable factors (Shipman et al., 2017), we conduct propensity score matching analysis (PSM) by matching sample firms with control firms having similar characteristics according to a function of covariates (Rosenbaum & Rubin, 1983, 1985). We use the nearest neighbour (NN), Radius and Kernel techniques to perform the PSM tests.

In our setting, we first model the determinants of business strategy among firms. Instead of grouping firms based on the mean (median) of their strategy score, we consider firms as *PROSPECT* (treatment group) if their strategy scores are equal or above 24, and those firms with a strategy score equal or lower than 12 as *DEFEND* (control group). We do so because there is a large proportion (about 80%) of firms belonging to *ANALYSE* groups. Partitioning the sample based on the median strategy score will result in many analyser firms becoming prospector as well as defender firms. To ensure a balance between treated and control subjects in the matched sample (Austin, 2011), we include all of the control variables as shown in equation (1) as potential determinants of firm-level business strategy. One important function of PSM is to examine the distribution of measured baseline covariates between treated and control subjects. If there are no systematic differences in the baseline covariates between these two groups after conditioning on the propensity score, the propensity-scoring model has been correctly specified (Austin, 2011).

In Table 3.5, Panel A, the p-values for the t-test indicate that the matching algorithm was successful in achieving balance for all of the covariates. All of the 15 t-tests are statistically insignificant between the treated and the control sub-groups in all three PSM techniques conducted with a calliper of 0.01 and without replacement for the nearest neighbour, radius and kernel methods. Panel B of Table 3.5 presents the PSM regression results for the NN (columns 1 and 4); Radius (columns 2 and 5) and Kernel (columns 3 and 6) methods. Results in columns (1) to (6) are consistent with the main results. For example, the coefficients on *STRATEGY* are positive and significant for both the *LnGAP* (0.035, p<0.01) and *LnVPSTD* (0.035, p<0.01) specifications in column (1) and in column (4) for the NN method. Overall, the PSM analysis provides robust evidence about the positive association between business strategy and tournament incentives.

Table 3.5: Propensity-matched technique

Panel A: Propensity-matched variables

	Nearest Neighbour (NN)				RADIUS				KERNEL			
Variable	Treated	Control	t-stat	p-value	Treated	Control	t-stat	p-value	Treated	Control	t-stat	p-value
SIZE	22.26	22.23	0.39	0.70	22.26	22.23	0.34	0.73	22.26	22.25	0.13	0.90
LEV	0.37	0.37	-0.36	0.72	0.37	0.37	0.28	0.78	0.37	0.38	-0.46	0.64
MTB	3.75	3.95	-0.64	0.52	3.75	3.70	0.19	0.85	3.75	3.67	0.29	0.77
SGROW	0.34	0.36	-0.43	0.67	0.35	0.34	0.26	0.80	0.35	0.32	0.80	0.43
ROE	0.08	0.07	0.75	0.45	0.08	0.08	0.01	0.99	0.08	0.08	0.44	0.66
DUAL	0.35	0.33	0.63	0.53	0.35	0.34	0.05	0.96	0.35	0.33	0.43	0.67
AGE	48.89	48.27	1.52	0.13	48.85	48.92	-0.16	0.87	48.85	48.94	-0.22	0.83
CEOHOLD	12.32	12.52	-0.42	0.67	12.37	12.53	-0.34	0.74	12.40	11.84	1.14	0.26
TENURE	3.59	3.62	-0.36	0.72	3.60	3.62	-0.26	0.79	3.60	3.58	0.15	0.88
CEOBRD	0.95	0.96	-0.95	0.34	0.95	0.94	0.24	0.81	0.95	0.94	0.39	0.70
BSIZE	2.12	2.14	-1.07	0.29	2.13	2.12	0.25	0.80	2.13	2.13	-0.19	0.85
BIND	0.38	0.37	1.26	0.21	0.38	0.38	-0.20	0.84	0.38	0.38	0.22	0.82
MOWN	0.21	0.20	0.75	0.45	0.21	0.21	-0.03	0.98	0.21	0.20	0.92	0.36
LnGDP	10.56	10.56	0.07	0.94	10.56	10.56	-0.07	0.95	10.56	10.55	0.12	0.90
SOE	0.19	0.18	0.26	0.80	0.19	0.18	0.31	0.75	0.19	0.21	-0.87	0.38

Note: In panel A of table 5, we use common calliper (.01)

Panel B: OLS model

	1	2	3	4	5	6
	NN	RADIUS	KERNEL	NN	RADIUS	KERNEL
	LnGAP	*LnGAP*	*LnGAP*	*LnVPSTD*	*LnVPSTD*	*LnVPSTD*
STRATEGY	0.035***	0.027***	0.027***	0.035***	0.030***	0.031***
	[5.19]	[8.99]	[9.05]	[4.84]	[9.61]	[9.70]
SIZE	0.393***	0.316***	0.316***	0.377***	0.325***	0.325***
	[8.64]	[20.50]	[20.57]	[8.14]	[20.44]	[20.49]
LEV	-0.546**	-0.542***	-0.542***	-0.483**	-0.588***	-0.588***
	[-2.37]	[-7.06]	[-7.08]	[-1.99]	[-7.05]	[-7.06]
MTB	0.020*	0.022***	0.022***	0.019*	0.023***	0.023***
	[1.86]	[3.99]	[4.01]	[1.73]	[4.24]	[4.25]
SGROW	-0.042	-0.038	-0.044*	-0.067	-0.066**	-0.078***
	[-0.76]	[-1.50]	[-1.86]	[-1.12]	[-2.46]	[-2.97]
ROE	0.433	0.696***	0.694***	0.472	0.574***	0.577***
	[1.49]	[6.78]	[6.78]	[1.45]	[5.38]	[5.41]
DUAL	0.094	0.096***	0.096***	-0.124	-0.139***	-0.141***
	[1.21]	[3.06]	[3.06]	[-1.42]	[-3.92]	[-3.96]
AGE	0.008	0.007***	0.007***	0.002	0.003	0.003
	[1.34]	[3.74]	[3.75]	[0.36]	[1.46]	[1.54]
CEOHOLD	-0.002	0.004**	0.004**	0.000	0.002	0.002
	[-0.25]	[2.02]	[2.03]	[0.06]	[0.77]	[0.76]
TENURE	-0.027	-0.068***	-0.068***	-0.041	-0.065***	-0.066***
	[-0.91]	[-6.43]	[-6.48]	[-1.22]	[-5.73]	[-5.79]
CEOBRD	-0.083	0.000	0.001	-0.159	-0.001	0.000
	[-0.60]	[-0.01]	[0.02]	[-1.12]	[-0.02]	[0.01]
BSIZE	-0.116	0.003	0.003	-0.058	-0.017	-0.015
	[-0.52]	[0.03]	[0.04]	[-0.24]	[-0.20]	[-0.18]
BIND	0.069	0.099	0.095	0.009	0.153	0.141
	[0.09]	[0.37]	[0.36]	[0.01]	[0.55]	[0.51]
MOWN	-0.595***	-0.622***	-0.625***	-0.440*	-0.508***	-0.510***
	[-2.85]	[-6.23]	[-6.30]	[-1.90]	[-4.54]	[-4.59]
LnGDP	0.212***	0.174***	0.174***	0.198***	0.177***	0.177***
	[4.15]	[8.99]	[9.02]	[3.39]	[8.55]	[8.55]
SOE	-0.421***	-0.454***	-0.455***	-0.298***	-0.348***	-0.349***
	[-4.39]	[-14.54]	[-14.56]	[-2.99]	[-10.71]	[-10.76]
Industry	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Constant	1.194	2.667***	2.661***	1.716	2.205***	2.202***
	[0.81]	[6.07]	[6.07]	[1.14]	[4.80]	[4.81]
Observations	910	5696	5,704	860	5,404	5,413
Adj. R-squared	0.22	0.21	0.21	0.19	0.17	0.17

Note: This table reports PSM regression results relating business strategy to tournament incentives and control variables. Continuous variables are winsorized at their 1st and 99th percentiles. Robust t-statistics are in brackets. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix A.

3.4.5 Business strategies, tournament incentives and future firm performance

To test the effects of tournament incentives on changes in firm performance for firms that adopt different business strategies (H2), we, estimate the following OLS regression model:

$$\Delta ROA_{i,t+1}\ (\Delta TOBINQ_{i,t+1}) = \gamma_0 + \gamma_1 LnGAP_{i,t} + \gamma_2 STRATEGY_{i,t} + \gamma_3 LnGAP_{i,t} * STRATEGY_{i,t} + \sum Controls + Industry + Year + \varepsilon_{i,t} \quad (2)$$

Where $\Delta ROA_{i,t+1}$ and $\Delta TOBINQ_{i,t+1}$ are one-year ahead changes in firm performance. Controls variables are those used in equation (1) and are previously defined. Results in columns (1) and (2) in Table 3.6 document a significantly positive effect of current period tournament incentives (*LnGAP* and *LnVPSTD*) on 1-year-ahead changes in ROA (coefficient=0.003, p<0.01; coefficient=0.002, p< 0.05), reflecting that tournament incentives enhance firm performance. Our main variable of interest is the interactive variable *STRATEGY*LnGAP* and *STRATEGY*LnVPSTD*. However, only *STRATEGY*LnVPSTD* (coefficient= 0.002, p<0.10) report a positive association with firm performance. This indicates partially that wider pay disparity in firms with innovative business strategies lead to better performance. We then re-estimate the regression by using an alternative performance measure, TOBINQ. However, the interactive coefficient for both *STRATEGY*LnGAP* and *STRATEGY*LnVPSTD* are insignificant as shown in columns (3) and (4) of Table 3.6. Altogether, evidence in Table 3.6 provides some weak evidence that the use of tournament incentives leads to better performance for firms pursuing innovative business strategies.

Table 3.6: Tournament incentives and future performance conditional on business strategy

	1	2	3	4
	Pooled	Pooled	Pooled	Pooled
	DV= ΔROA (ROA_{t+1} - ROA_t)		DV= $\Delta TOBINQ$ ($TOBINQ_{t+1}$ -$TOBINQ_t$)	
STRATEGY	0.000	0.000	0.000	0.001
	[-0.43]	[-0.52]	[0.11]	[0.15]
LnGAP	0.003***		0.015	
	[3.05]		[0.83]	
*STRATEGY*LnGAP*	0.002		-0.019	
	[1.44]		[-0.72]	
LnVPSTD		0.002**		0.027
		[2.57]		[1.47]
*STRATEGY*LnVPSTD*		0.002*		-0.008
		[1.70]		[-0.32]
PROSPECT				
*PROSPECT*LnGAP*				
*PROSPECT*LnVPSTD*				
SIZE	-0.002	-0.002	-0.142***	-0.145***
	[-1.39]	[-1.33]	[-6.10]	[-6.17]
LEV	0.012	0.013	0.280**	0.278**
	[1.08]	[1.17]	[2.48]	[2.45]
MTB	0.000	0.000	-0.086***	-0.086***
	[-0.81]	[-0.63]	[-5.43]	[-5.39]
SGROW	-0.001	-0.001	-0.011	-0.01
	[-0.56]	[-0.51]	[-0.34]	[-0.32]
ROE	-0.166***	-0.167***	-0.505***	-0.522***
	[-9.18]	[-9.09]	[-3.74]	[-3.85]
DUAL	-0.001	0.000	0.020	0.032
	[-0.54]	[-0.08]	[0.45]	[0.72]
AGE	0.000*	0.000	0.005	0.005
	[1.67]	[1.51]	[1.58]	[1.44]
CEOHOLD	0.000	0.000	-0.003	-0.003
	[-0.28]	[-0.03]	[-1.09]	[-1.16]
TENURE	0.000	0.000	-0.023	-0.021
	[-0.46]	[-0.42]	[-1.50]	[-1.36]
CEOBRD	0.004	0.004	0.132**	0.131**
	[1.47]	[1.50]	[2.27]	[2.23]
BSIZE	0.006	0.005	0.008	0.016
	[1.13]	[1.02]	[0.08]	[0.16]
BIND	0.007	0.015	0.753**	0.737**
	[0.37]	[0.88]	[2.30]	[2.22]
MOWN	-0.008	-0.009	-0.363***	-0.357***
	[-1.34]	[-1.59]	[-2.90]	[-2.87]
LnGDP	0.000	0.000	0.037	0.036
	[-0.34]	[-0.32]	[1.42]	[1.36]
SOE	-0.003	-0.003*	-0.073*	-0.070*
	[-1.62]	[-1.86]	[-1.80]	[-1.75]
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
Constant	-0.022	-0.019	1.699***	1.651***
	[-0.57]	[-0.50]	[2.92]	[2.84]
Observations	4,063	4,037	2,937	2,920
Adj. R-squared	0.16	0.16	0.28	0.28

Note: This table presents the OLS regression results for the effects of tournament incentives on future firm performance conditional on different firm-level business strategies. Robust standard errors are reported in parentheses. *, **, *** correspond to 1%, 5% and 10% levels of significance, respectively. Variable definitions are provided in Appendix A.

3.4.6 Business strategy and tournament incentives: SOEs versus Non-SOEs

In the Chinese stock market, a large proportion of listed companies are SOEs (Chen et al., 2011; Hass et al., 2016; Kato & Long, 2011). Unlike executives in non-SOEs, executives of SOEs have not only economic motivation, but also strong political motivation, because they could enjoy extensive political perks that are not available to their counterparts along with their political positions (Zhang et al., 2018). The higher the political position, the larger the perks they can acquire. Hence, they can be induced to pursue political promotion rather than internal corporate promotion. Furthermore, SOEs normally have financial support from the state, thus, when SOEs suffer losses or go bankrupt, the state will increase investments and loans, reduce taxes or provide financial subsidies to ensure their survival (Sheng et al., 2019; Tao et al., 2017). Therefore, the positive association between business strategy and tournament incentives may be weaker in SOEs.

Considering that 40 percent of our sample is SOEs, we further divide the sample into two subsamples based on whether a firm is an SOE or not. We examine the effect of state ownership on the link between business strategy and tournament incentives. However, contrary to our expectation, results in column (1) and (2) of Table 3.7 report that the coefficients on *STRATEGY* are positive and significant for both the SOE (in column (1), coefficient= 0.023, $p<0.01$) and non-SOE group (in column (2), coefficient= 0.025, $p<0.01$). The insignificant chi-square implies that business strategy affects tournament incentives in both groups. Therefore, state ownership does not exert a differential effect on the association between business strategy and tournament incentives.

State ownership can be further classified into "central SOEs", controlled by the central government, and "local SOEs", controlled by local government.[18] As local SOEs have stronger

[18] If the firm's ultimate shareholder is central government, it is considered a central state-owned enterprise (any central government unit, such as Ministry of Finance or Central Industrial Enterprises Administration Committee). If the firm's ultimate shareholder is a local government, it is considered a local state-owned enterprise (any

market orientation and managerial autonomy, they have been prompted by market liberalization to deploy diversification strategies targeted at their business priorities (Li et al., 2018). The extent of state control over central SOEs' business strategies is likely to be stronger compared with their counterparts in local SOEs. To sustain macro-level growth and national industrial policies, central SOEs comply with more restrictive investment approval procedures and closer scrutiny of their diversification initiatives (Li et al., 2018). Consistently, Zhang and Li (2006) find that development goals set by local government (e.g., enhancing production output and employment) promote the business diversification of local SOEs. We therefore predict that the association between business strategies and tournament incentives in central SOEs will be weaker compared with local SOEs. We thus re-estimate the regression on two sub-sample groups, based on the nature of state ownership. We create a dummy variable *SOE_Central*, coded 1 if a SOE is centrally controlled, and zero otherwise (*SOE_Local*). The positive and significant association holds only for local SOEs as shown in Table 3.7, column (4) (coefficient=0.042, $p<0.01$), suggesting that business strategy does not influence tournament incentives for central SOEs. We further test whether the effects of tournament incentives on future firm performance are conditional on firm-level business strategies for the central versus local SOE group. However, we fail to find any such evidence as the interactive coefficient *STRATEGY* LnGAP* is insignificant for both sub-groups. Overall, our results indicate that the positive association between business strategy and tournament incentives is confined to local SOEs and non-SOEs. But firms' future performance is not related to tournament incentives among prospect-type central-SOE firms or their local-SOE counterparts.

department in the local government, such as Bureau of State Assets Management or Finance Bureau) (Wang et al., 2008).

Table 3.7: Business strategies, tournament incentives and firm performance: The effect of state ownership

	1	2	3	4	5	6	7	8
DV=*LnGAP*					DV= ΔROA_{t+1} $(ROA_{t+1} - ROA_t)$		DV= $\Delta TobinQ_{t+1}$ $(TobinQ_{t+1} - TobinQ_t)$	
	SOE=1	SOE=0	*SOE_Central*	*SOE_Local*	*SOE_Central*	*SOE_Local*	*SOE_Central*	*SOE_Local*
STRATEGY	0.023***	0.025***	-0.002	0.042***	0.000	0.000	-0.000	-0.006
	[4.42]	[6.74]	[-0.26]	[5.81]	[0.24]	[0.02]	[-0.01]	[-0.89]
LnGAP					0.003	0.003*	-0.003	0.008
					[1.22]	[1.89]	[-0.06]	[0.33]
*STRATEGY*LnGAP*					-0.001	0.000	-0.044	-0.004
					[-0.43]	[0.11]	[-0.86]	[0.12]
SIZE	0.254***	0.420***	0.168***	0.322***	-0.004	-0.003*	-0.158***	-0.055**
	[12.72]	[20.42]	[5.93]	[10.99]	[-1.58]	[-1.66]	[-4.05]	[-2.00]
LEV	-0.737***	-0.450***	-0.646***	-0.759***	0.029**	0.010	0.319	0.018
	[-6.22]	[-4.50]	[-3.70]	[-4.61]	[2.02]	[0.98]	[1.34]	[0.12]
MTB	0.005	0.040***	0.001	0.003	0.000	-0.001**	-0.070***	-0.047***
	[0.85]	[7.75]	[0.15]	[0.35]	[0.70]	[-2.19]	[-5.74]	[-4.49]
SGROW	0.020	-0.073***	-0.023	0.085	-0.003	-0.000	-0.013	0.065
	[0.49]	[-2.61]	[-0.45]	[1.31]	[-0.73]	[-0.07]	[-0.18]	[1.08]
ROE	0.620***	0.579***	0.575***	0.617***	-0.113***	-0.142***	-0.261	-0.490***
	[5.00]	[4.44]	[3.32]	[3.52]	[-8.20]	[-12.48]	[-1.19]	[-3.19]
DUAL	0.127*	0.133***	0.071	0.155*	0.015	0.003	0.095	0.199***
	[1.85]	[3.80]	[0.60]	[1.79]	[1.58]	[0.63]	[0.63]	[2.69]
AGE	0.008**	0.008***	0.007	0.006	0.001	0.000	0.011	0.001
	[2.01]	[3.65]	[1.10]	[1.11]	[1.04]	[0.66]	[1.38]	[0.19]
CEOHOLD	0.008**	0.000	0.006	0.007	0.000	-0.000	-0.006	-0.002
	[2.06]	[0.07]	[0.98]	[1.45]	[0.32]	[-0.12]	[-0.75]	[-0.37]
TENURE	-0.052***	-0.081***	-0.033	-0.053**	-0.002	0.000	-0.017	-0.032
	[-2.99]	[-5.96]	[-1.29]	[-2.26]	[-0.74]	[0.32]	[-0.49]	[-1.52]
CEOBRD	0.166**	-0.085	0.273***	0.056	-0.004	0.010	0.233*	0.131
	[2.33]	[-1.55]	[2.67]	[0.57]	[-0.51]	[1.59]	[1.78]	[1.53]
BSIZE	-0.216*	0.272***	-0.144	-0.271*	0.006	0.009	-0.035	0.052
	[-1.88]	[2.60]	[-0.79]	[-1.79]	[0.43]	[0.98]	[-0.15]	[0.40]
BIND	-0.258	0.911***	0.688	-0.483	0.021	-0.001	0.915	0.747
	[-0.64]	[2.70]	[1.22]	[-0.83]	[0.46]	[-0.03]	[1.22]	[1.49]
MOWN	1.285	-0.365***	2.629**	0.304	-0.082	-0.068	1.133	0.693
	[1.43]	[-3.57]	[2.06]	[0.24]	[-0.85]	[-0.88]	[0.76]	[0.59]
LnGDP	0.249***	0.105***	0.340***	0.229***	-0.004	0.001	0.052	-0.048

	[8.14]	[4.45]	[7.14]	[5.55]	[-1.03]	[0.55]	[0.80]	[-1.29]
Industry	YES	YES	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES	YES	YES
Constant	2.933***	0.456	4.337***	1.646**	-0.036	-0.012	1.795	0.939
	[4.97]	[0.76]	[4.79]	[1.99]	[-0.47]	[-0.23]	[1.49]	[1.27]
Observations	2,310	3,395	962	1,348	738	1,002	564	774
Adj. R^2	0.19	0.21	0.17	0.22	0.11	0.17	0.22	0.21
Chi2(1)	0.15		19.28		0.04		0.26	
Prob > chi2	0.6940		0.00		0.838		0.611	

Note: The left panel of the table presents the OLS regression results for the relation between business strategies and tournament incentives for central SOE versus local-SOE firms. The right panel of the table presents the OLS regression results for the effects of tournament incentives on changes in firm performance for firms with different business strategies for the central-SOE versus local-SOE sub-sample. Robust standard errors are reported in parentheses. *, **, *** correspond to 1%, 5% and 10% levels of significance, respectively. Variable definitions are provided in Appendix A.

3.5 Conclusion

This study examines the impact of business strategy on tournament incentives for a sample of Chinese listed firms from 2011 to 2017. We argue that firms following innovative strategies are more likely to enlarge their tournament size. We find evidence consistent with this hypothesis. The findings remain robust to alternative measurements of tournament incentives, and to potential endogeneity concerns. Furthermore, we find that innovative firms with larger tournament incentives tend to have better performance. In addition, the empirical findings also suggest that the positive relation between business strategy and tournament incentives is confined to non-SOEs and local SOEs.

Our study contributes to existing literature in several important aspects. First, we provide empirical evidence for the positive association between firm-level business strategies and tournament incentives in the emerging market context, which fills a void in the scant literature. Our study makes an incremental contribution to the existing tournament literature by providing new evidence on the importance of business strategies in determining cash-based tournament incentives in China. Second, the positive association is pronounced only for non-SOEs and local SOEs. This finding has policy implications, as it suggests pay disparity for prospector-type local SOEs is sensitive to business strategies and, thus, the "Pay Cap" policy may be more appropriate for central SOEs and defender-type local SOEs. Lastly, our findings have practical implications to corporate boards and investors by shedding light on the positive effect of tournament incentives on firm performance for prospector-type firms.

CHAPTER FOUR- TOURNAMNET INCENTIVES AND STOCK PRICE CRASH RISK: EVIDENCE FROM CHINA (ESSAY THREE)

4.1 Introduction

This essay investigates the effects of tournament incentives on stock price crash risk in China. Agency theory suggests that self-interested managers may pursue their own goals, instead of pursuing goals aimed at maximizing shareholder value (Jensen & Mecking, 1976). Designing an optimum executive compensation scheme based on firm performance has the potential to incentivize managers towards pursuing the latter objective (Guay, 1999; Kale et al., 2009; Kubick & Masli, 2016; Lazear & Rosen, 1981; Murphy, 1999). However, CEO compensation does not always relate to firm performance because of managerial power and rent extraction by self-serving managers (Bebchuk & Fried, 2003; Bertrand & Mullainathan, 2001; Blanchard et al., 1994; Murphy, 1999; Yermack, 1997). Although intense monitoring could overcome the "entrenchment" problem, it is excessively costly for principals to assess managerial performance in absolute performance terms, because of, for example, monitoring difficulties, and because managerial actions cannot be fully contracted *ex ante* (Bloom & Michel, 2002). Therefore, an alternative form of compensation arrangement, the rank-order tournament, has been used by corporations (Lazear & Rosen, 1981).

Unlike performance-based incentives, which rely on absolute terms, tournament incentives (promotion-based compensation incentives) work as a contest between senior executives, embracing the notion that only the best relative performer will be the winner (Bognanno, 2001; Eriksson, 1999; Lazear & Rosen, 1981). Having the chance to be promoted

to the highest level in the corporate hierarchy is desirable for potential candidates, as it often comes with generous remuneration, perks, and privileges (Bognanno, 2001; Murphy, 1999).

We posit that such tournament incentives have implications for stock price crash risk. The literature defines crash risk as related to negative skewness in the distribution of returns for individual stocks (Chen et al., 2001). Opaque financial reporting to conceal bad news has been suggested to be the primary driver of price crash. When the accumulated bad news is released to the market, it can result in a sharp decline in stock prices (Hutton et al., 2009; Jin & Myers, 2006).

There are competing arguments as to whether tournament incentives aggravate or attenuate price crash. On one hand, tournament incentives induce earnings manipulation. Managers can increase their chance of promotion by manipulating the reported earnings (Bryan & Mason, 2017; Park, 2017). Managers are also likely to take risky projects to boost firm performance. Feng et al. (2017) find that corporate risk-taking is associated positively with both accrual-based and real transaction-based earnings manipulation. However, both earnings manipulation and risk-taking behaviours exacerbate information asymmetry. When corporate performance is not as good as expected, managers may consider this bad news as temporary and, thus, conceal it. However, when such a decline in performance persists for a longer period, managers have to release the accumulated negative news to the stock market, thereby, causing the stock prices to crash.

However, Habib et al. (2018) argue that pressure from non-CEO executives (i.e. VPs) can constrain top executive misbehaviour and, therefore, result in delivery of higher quality financial reporting, thus, lowering the risk of price crash. Tournament incentives, as an implicit internal monitoring mechanism, can motivate non-CEO executives to exert more effort towards enhancing firm performance. For example, Chen et al. (2016) find that promotion-based compensation incentives encourage non-CEO executives to uncover the wrongdoings of the

CEO, since the opportunity for their own promotion improves with the departure of the current CEO. As a result, they monitor the CEO's behaviour closely, constrain misreporting of the top executive and, thus, reduce earnings manipulation (Chen et al., 2016). Zhang et al. (2018), using a large sample of Chinese listed companies, find that cash-based tournament incentives constrain the likelihood of financial restatements: an effect that is stronger for SOEs as compared to non-SOEs.

Jia (2018a) examines the association between equity-based tournament incentives and price crash in the U.S. and documents a positive association between tournament incentives and price crash. We revisit Jia (2018a) using data from China for the following reasons. Firstly, a large number of tournament studies have been conducted in the U.S., where equity-based compensation schemes dominate, and the pay gap between the CEO and other senior executives is quite large. Prior literature provides ample evidence that equity-based compensation schemes encourage executives to engage in earnings management (Burns & Kedia, 2006). Unlike U.S. executives, Chinese executives receive predominantly cash-based compensation (i.e. cash salary, bonus and perks) (Huang & Boateng, 2017; Zhang et al., 2018).[19] Prior literature in Asian countries documents that cash-based compensation could also induce earnings manipulation (Iwasaki et al., 2018; Shuto, 2007). However, one recent tournament study in China shows that tournament incentives reduce the likelihood of financial restatements (Zhang et al., 2018). Thus, mixed evidence exists as to whether cash-based compensation impairs or improves financial reporting quality in Asian countries. Sun et al. (2010) suggest that performance criteria for executive compensation and ownership structure are the two crucial factors that have important implications for the differences in executive compensation between China and the U.S. Hence, it is far from clear whether the U.S. evidence

[19] Based on the data we collected for this study, during the period of 2007 -2016 the proportion of equity incentives used by Chinese listed firms increased from 14.30% to 15.23%. However, the proportion is still low when compared with that for cash-based compensation.

of a positive association between tournament incentives and price crash is equally applicable in China.

Second, the strong government influence through a large proportion of state ownership in the listed SOEs has significant implications for the effectiveness of rank-order tournaments in China (Conyon & He, 2011; Firth et al., 2006; Lin & Lu, 2009). In contrast to the market economy of U.S., the listed companies in China are largely affected by the political environment. Previous studies document that the positive impact of tournament incentives on firm performance is weaker for firms with greater state ownership (Chen et al., 2011; Kato & Long, 2011; Lin & Lu, 2009). Unlike executives in non-SOEs, executives in SOEs receive political perks in addition to cash compensation. Such political perks are a key component of their total compensation, and are determined based on the executive's administrative/political position. The higher their position in the political hierarchy, the more benefits they receive. Chen et al. (2017a) find that the political ranking system attenuates price crash in China.

Our study is different to Chen et al. (2017a) in three aspects. First, they study external tournament incentives (incentives to climb the political ladder), whereas the tournament incentives we examine are internal (incentives to move up within the corporate hierarchy). Second, they take a single-agent perspective by focusing on the current CEO and the Board chairman. We, on the other hand, focus on the entire top management team and examine how tournament incentives among senior executives affect price crash. Third, unlike Chen et al. (2017a) who restrict their study to SOE firms only, we include both SOE and non-SOE firms and test whether the association between tournament incentives and price crash is moderated by government ownership. Over the past decade, non-SOEs have grown rapidly and have contributed to half of the national economy. However, non-SOE research on tournament incentives is very limited.

To examine the association between tournament incentives and price crash, we employ three measures of price crash: negative conditional skewness (*NCSKEW*), down-up volatility (*DUVOL*), and a binary measure capturing the occurrence of price crash within the fiscal year (*CRASH_DUM*). Tournament incentives are operationalized as the natural logarithm of the pay gap between the top three executives and the remaining executives (*LnGAP*). Using a large sample of non-financial Chinese listed firms in the A-share market during the period from 2007 to 2016, we find that tournament incentives constrain price crash. In terms of economic significance, the reported coefficient implies that a one standard deviation increases in *LnGAP*, in year t, is associated with a 5.14 and 4.04 percent decreases in *NCSKEW* and *DUVOL*, respectively, in year t+1. The main findings are robust to alternative measures of tournament incentives and price crash. To deal with the endogeneity issues that can arise from omitted variables, reverse causality, or model misspecification problems, we also conduct propensity score matching (PSM) tests, and find results that are consistent with the main results. We then test for the mediating effect of financial reporting quality on the association between tournament incentives and price crash. We find that tournament incentives increase conditional conservatism, which then decreases price crash. Finally, we test for the moderating effect of state ownership on the association between tournament incentives and price crash, and find the association is negative and significant for non-SOE observations, but insignificant for the SOE observations.

Our study contributes to existing literature in several important aspects. First, as a significant emerging market with a mixed state-supported and market-oriented economy, China's experience with predominantly cash-based tournament incentives sheds new light on the tournament literature. Burns et al. (2017) demonstrate the importance of considering the institutional differences, e.g., cultural, economic, political and legal differences, within which the tournament mechanisms operate. We further enrich the tournament incentives and price

crash research by documenting the mediating effect of conditional conservatism on this relationship. Second, our study enriches the executive compensation research by focusing on the executive-team instead of the CEOs alone, as pay gap research has received far less attention than CEO compensation research, especially in the emerging economies (Aggrawal & Samwick, 2003; Barron & Waddell, 2003). Unlike CEOs, who receive only an arranged payment based on their absolute performance, senior executives receive additional compensation based on their performance benchmarked against their peers. The higher the pay gaps between the CEO and the next layer of executives, the stronger the motivation for promotion. Since the nature of executive work demands a high degree of task interdependencies, promotion-based incentive schemes among executives would be expected to influence the functioning of the top executive team (Park, 2017). Hence, it is interesting to explore how promotion-based incentive plans affect executive behaviour, which, in turn, affects firm performance.

The rest of the essay is organized as follows. Section 4.2 provides an overview of the Chinese institutional environment for executive compensation. Section 4.3 reviews the literature on tournament incentives and develops the hypotheses. Section 4.4 explains the research design issues. Sample selection and descriptive statistics are reported in Section 4.5. Section 4.6 provides our main test results and Section 4.7 concludes the paper.

4.2 Institutional environment in China

The tremendous economic development and growing capital markets in China have highlighted the beneficial effects of solid corporate governance mechanisms in protecting investors' interests. Although Chinese corporate governance has been criticised as ineffective and weak (Clarke, 2003; Liu, 2006), an increasing number of Chinese executives and entrepreneurs show the willingness and desire to improve their CG practices (CFA Survey, 2007). This is reflected in the steady improvement in China's listed company governance index

(CCGINK), the earliest published corporate governance index in China, from a low of 48.96 in 2003 to 62.49 in 2015. Chinese publicly traded firms have become more capital market-oriented as a result of ongoing economic reforms. Hence, an increasing number of listed firms have started to use executive compensation schemes aimed at rewarding superior executive performance, and encouraging executives to align their interests with those of their shareholders. This has also been evidenced through emergence of tournament incentives in China (Zhang et al., 2018).

The Chinese Securities Regulation Committee (CSRC) did not mandate the disclosure of executive compensation information prior to 2000 (CSRC, 1998). However, beginning from 2001, publicly traded firms were required to disclose the lump sum compensation of the three highest-paid executives and the three highest-paid board members (including executive board members) in their annual reports. By 2006, all publicly listed firms were mandatorily required to report board members' and top management's total compensation (the sum of salary, bonus, stipends, and other benefits) (CSRC, 2005a, 2007).

Sun et al. (2010) review the executive compensation literature in Asia, and find that performance criteria (earning-based performance) and ownership structure (state ownership), are two important factors that have profound implications for differences in executive compensation in China versus the U.S. Unlike companies in the U.S, where equity-based compensation constitutes the bulk of the total compensation (Jensen & Meckling, 1976; Murphy, 1999), the overwhelming majority of Chinese companies award cash-based compensation (Huang & Boateng, 2017). More specifically, Chinese executives typically receive compensation on earnings-based performance, rather than on stock-based performance (Conyon & He, 2016; Cordeiro et al., 2016; Li et al., 2013; Xiao et al., 2013). Although the CSRC circulated the "Methods of Listed Companies' Stock Incentive" (stock options) at the end of 2005, it allowed only a few listed companies to grant stock options or restricted stocks

to their top executives (CSRC, 2005b). Therefore, both the coverage, and the percentage of stock-based compensation to total compensation, is relatively small among Chinese listed firms. A sizable literature has documented a positive association between executive compensation and firm performance in China (Buck et al., 2008; Firth et al., 2006; Kato & Long, 2006).

In China, nearly half of the listed companies are state-owned, with the Chinese government holding significant voting rights in these firms (Conyon & He, 2011; Firth et al., 2006; Hass et al., 2016). Evidence suggests that the significant government ownership weakens the association between executive compensation and corporate performance in SOEs (Choe & Yin, 2000; Huang & Zhang, 1998; Kato & Long, 2006; Qian, 1996; Xu & Wang, 1999). Similarly, the positive impact of tournament incentives on firm performance has also been found to be weaker for firms with greater state ownership (Chen et al., 2011; Kato & Long, 2011; Lin & Lu, 2009). This may be attributable to the unique executive compensation structure for executives in SOEs. For executives in SOEs, political perks are the key component of total compensation, and are influenced heavily by the executive's political position. Executives in SOEs with higher political positions could enjoy life-long benefits (which are not explicitly specified in the compensation plan), including high levels of pension, substantial housing subsidies, fully subsidized medical treatment, and job security (Chen et al., 2011; Kato & Long, 2006).

In the recent decade, the managerial compensation for executives in the SOEs tightened through the "pay cap" policy, which has reduced the difference between the average payment to SOE executives and the average salary of SOE employees from a ratio of 12:1 to 7:1 or 8:1 (Zhang et al., 2018). This has further increased SOE executives' desire for position salaries. Given the significance of SOEs and their unique compensation structure, we test specifically whether the effect of tournament incentives on price crash is moderated by government ownership status.

4.3 Literature review and hypotheses development

The separation of ownership and control gives rise to information asymmetries that managers may use to exploit external individual shareholders (Berle & Means, 1932; Jensen & Meckling, 1976). Previous studies have shown that external market forces, e.g., product market competition (Alchian, 1950; Stigler, 1958), the market for corporate control (Manne, 1965), and pressure from the labour market (Fama, 1980), can constrain managerial opportunism. However, despite these external market forces, there is still a demand for internal corporate governance measures, including a well-designed executive compensation scheme.

Evidence on the implications of explicit forms of compensation schemes is mixed. Some studies document that a well-designed compensation system enhances firm performance (Aggarwal & Samwick, 2006; Baker et al., 1988; Conyon & He, 2011; Jensen & Murphy, 1990; Kaplan, 1994; Kato & Long, 2006; Tang & Sun, 2014). However, such compensation schemes may partially contribute to the agency problem, since they may induce managerial rent-seeking (Bertrand & Mullainathan, 2001; Blanchard et al., 1994; Yermack, 1997), as executives have substantial influence over their own pay (Bebchuk & Fried, 2003). The greater the power of managers, the greater is their ability to extract rents. It is very costly to monitor executives effectively, because many unforeseen contingencies cannot be contracted *ex-ante*. Therefore, executives are likely to shirk responsibilities when monitoring is less than perfect (Lazear & Rosen, 1981). Hence, explicit forms of compensation contracts could produce less than optimal outcomes, and this has made tournament-based compensation plans a popular approach.

The tournament theory was originally developed by Lazear and Rosen (1981) and then extended by Rosen (1986). The theory states that tournament incentives facilitate a contest among senior executives, and only the best relative performer in the contest can get the generous monetary rewards, as well as a superior position in the corporate hierarchy. Unlike the aforementioned explicit compensation plan, where certain goals are specified beforehand

(executives will only receive high rewards when certain firm performance goals are achieved), under tournament schemes, executive performance is often evaluated by comparing how well one does against the other competing executives. This system is particularly attractive given the high costs of monitoring absolute performance under the conventional compensation arrangements. Additionally, the rank order system changes the costs of measurement and the nature of the risk that executives undertake (Lazear & Rosen, 1981).

As alluded to before, successful promotion is associated with higher remuneration and superior status in the corporate hierarchy, while the remaining competitors "lose" the tournament and receive nothing (Faravelli et al., 2015). Hence, the large pay gap between CEO and senior executives encourages those executives to exert more effort towards promotion. Therefore, tournament incentives enable the company to retain high-performing managers with appropriate human capital, and produce better firm performance. A number of studies have found evidence supporting this proposition (e.g., Chen et al, 2011; Coles et al., 2017; Eriksson, 1999; Hu et al., 2013; Kale et al., 2009; Lee et al., 2008; Lin & Lu, 2009; Main et al., 1993; Xu et al., 2016). Some other studies document additional beneficial effects of tournament incentives. For instance, Chen et al. (2016) and Zhang et al. (2018) report that tournament incentives reduce managerial earnings manipulation activities, since the CEO/CFO faces greater scrutiny of the financial reporting process from incumbent executives. Coles et al. (2017) reveal that the industry pay gap is positively and closely associated with firm performance, and this relationship is stronger, when the probability that the next-level executives will win the contest, is higher. In addition, recent empirical research also suggests that tournament incentives are more likely to enhance innovation efficiency (Shen & Zhang, 2016; Xu et al., 2017a). Bloom and Michel (2002) provide evidence that stronger tournament incentives enable the company to retain high-performing managers with appropriate human capital. This, in turn, helps build a large pool of skilled internal candidates for the CEO position. The availability of

skilled internal candidates, not only reduces the entrenchment of the incumbent CEO by increasing the bargaining power of the board, but also reduces CEO succession risk (Chen et al., 2013). Besides, Chen et al. (2017a) find tournament incentives, which are proxied by managerial political ranks, have a constraining effect on price crash for Chinese listed SOEs.

Despite the empirical evidence showing positive consequences of tournament incentives, some prior research has also identified a number of dysfunctional consequences of tournament incentives (Bebchuk et al., 2011; Henderson & Fredrickson, 2001). The intense competition for promotion fosters aggressive and competitive behaviour on the part of the aspiring executives: actions that might prove damaging over the long run (Park, 2017). For example, evidence suggests that perceived inequity caused by large pay gaps may increase managerial turnover (Bloom & Michel, 2002), reduce collaboration and lower productivity (Pfeffer & Davis-Blake, 1992), mutual collaboration (Siegel & Hambrick, 2005), and increase risk-taking (Goel & Thakor, 2008; Kini & Williams, 2012). Further in this vein, Phan et al. (2017) state that tournament incentives induce high-risk investments and financing choices which, in turn, lead to greater cash-flow uncertainty. In the event of these high-risk investments failing, the incidence of financial misreporting activities will increase as an attempt to conceal the negative news (Armstrong et al., 2013). These are confirmed in studies on fraudulent behaviour (Haß et al., 2015), real earnings manipulation (Park, 2017), and audit fees (Bryan & Mason, 2017). Experimental studies find that when facing tournament incentives, executives are found to engage in high levels of dishonesty in performance reporting (Conrads et al., 2014) through more sabotage activities (Harbring & Irlenbusch, 2011). Jia (2018a) finds that tournament incentives increase price crash in the U.S.

The crash risk literature suggests that the primary cause of crash risk is bad news hoarding by corporate insiders (An & Zhang, 2013; Callen & Fang, 2013, 2015; Habib et al., 2018; Kim et al., 2011a, 2011b; Yuan et al., 2016). When facing stronger tournament incentives,

pragmatic managers can exploit their informational advantage and engage in short-sighted, opportunistic behaviour at the expense of long-run shareholders' wealth. In general, such actions: i.e., undertaking risky investment decisions that aim to temporarily boost valuations, engaging in earnings management and opaque financial reporting (Hutton et al., 2009), engaging in more aggressive tax strategies (Kim et al., 2011b), making more real earnings manipulations (Francis et al., 2016) and engaging in more exploratory innovations (Jia, 2018b), are unsustainable and will eventually result in stock price crashes once accumulated bad news is released to the market suddenly. However, more conservative financial reporting constrains price crash (Kim & Zhang, 2016). Prior crash risk literature in China documents a number of determinants price crash. For instance, firms with stronger internal controls (Chen et al., 2017b), higher social trust (Cao et al., 2017; Li et al., 2017) and stronger political connections (Hu & Wang, 2018) are less prone to price crash, whilst CEO duality (Chen et al., 2015a) and excess perks (Xu et al., 2014) accentuate price crash risk.

The non-CEO executives are contestants in a tournament for the CEO position, and they are heterogeneous. Each will have different ethical preferences, and some of them will always be honest (Conrads et al., 2014; Gneezy et al., 2013). Therefore, tournament incentives make collective collusion on earnings management less likely. When tournament participants detect and disclose a superior's misreporting or illegal behaviour, very often, the detection of such immoral behaviours will lead to severe career consequences for CEOs, such as forced resignation and termination (Hazarika et al., 2012). This CEO turnover, in turn, provides a chance for promotion of the internal candidates. In contrast, Zhang et al. (2018) document that in China, tournament incentives lower the likelihood of financial restatements, as restatement of financial reports may cause shareholders and investors to become sceptical about a subordinate's capacity to maximize firm value. As a result, executives will be discouraged from

taking actions that might subsequently cause restatements, if they believe that winning the tournament will give them a much higher return.

As discussed in the preceding section, senior executives in China receive cash-based compensation based on earnings performance (i.e. accounting profit) as opposed to the stock-based performance. It can be argued that cash-based tournament incentives motivate managers to inflate firm performance, to maximize short-term performance bonuses. Previous empirical studies in the U.S. find that executives have incentives to choose earnings-increasing accruals, to maximize the value of their bonus rewards (Healy, 1985; Shrieves & Gao, 2002). Some non-U.S. evidence, too, is consistent with this finding (e.g., Shuto (2007) in Japan). Park (2017) documents that cash-based tournament incentives induce more real earnings management, because the promoted CEO could benefit immediately from increased cash-based compensation. Since earnings opacity increases the risk of price crash, we hypothesize the following:

H1a: Tournament incentives increase future price crash in China.

However, in the face of costly earnings management, the salary component of compensation creates a disincentive for managers to practice aggressive earnings management. This is because managerial salary is usually set on an annual basis and is less likely to be adjusted according to reported earnings. Since earnings manipulation is a costly behaviour, and managers can acquire, at best, only a fixed benefit from such activity, they have less motivation to engage in earnings manipulation (Shrieves & Gao, 2002). Latridis (2018) finds that cash compensation is associated with discretionary accruals positively only when actual credit ratings differ from expected ratings.

Furthermore, shareholders, as the firm's principals, take earnings management incentives stemming from cash compensation into consideration, and might demand conservative, timely and reliable financial reporting (Iwasaki et al., 2018; Watts, 2003). Conditional conservatism practices require a higher degree of verification for recognising gains than for recognising losses. Thus, conservatism reflects the differential ability of accounting earnings to recognise economic losses relative to economic gains (Basu, 1997).[20] The timely recognition of losses is an important determinant of earnings quality, where earnings are used for contracting purposes, e.g., executive compensation contracts. Iwasaki et al. (2018) provide evidence for the positive relationship between accounting conservatism and cash-based compensation contracts in Japan. Since Chinese listed companies commonly use cash-based compensation contracts, we infer that shareholders are likely to demand more conditional conservatism in financial reporting, to mitigate severe information asymmetry in the Chinese capital market. Tournament incentives, thus, are expected to constrain price crash through more conservative and better quality financial reporting. We, therefore, develop the following competing hypothesis:

$H1_b$: Tournament incentives constrain future price crash in China.

4.4 Research design

4.4.1 Tournament measures

As mentioned before, there is no mandatory requirement for listed firms to report CEO compensation information alone. Consistent with this, we find that about 74% of our sample observations did not disclose CEO compensation (either the CEO's name or the CEO's salary

[20] In contrast to conditional conservatism, unconditional conservatism occurs through the application of accounting policies that consistently accelerate expenses or defer revenues, resulting in a lower profit figure than would otherwise be reported (Ruddock et al., 2006).

data was missing). Hence, it is not appropriate to measure the pay difference between the CEO and senior executives. We, therefore, follow previous Chinese studies on tournament incentives, and measure tournament incentives as the natural logarithm of the average pay gap between the top three executives and the remaining executives (*LnGAP*) (Liao et al., 2009; Lin & Lu, 2009; Zhang et al., 2018). According to the definition given by the China Stock Market and Accounting Research (CSMAR) database, the top management team includes the President, Vice Presidents, Secretary to the Board, and other senior executives as disclosed in the annual reports, excluding independent directors and supervisory board members. We also use the natural logarithm of the standard deviation of the pay differentials between the total compensation of top executives and the CEO (*LnVPSTD*)[21], as an alternative proxy for tournament incentives (Zhang et al., 2018).

4.4.2 Stock price crash risk

In this study, we adopt three measures of firm-level crash risk used widely in the extant literature (Habib et al., 2018). All three approaches are based on the firm-specific weekly returns estimated as the residuals from the Equation (1) below. This ensures that our crash risk measures reflect firm-specific factors rather than broad market movements. Specifically, we run the following expanded market model regression for each firm and year.

$$r_{i,t} = \alpha_j + \beta_{1,j} r_{m,t-2} + \beta_{2,j} r_{m,t-1} + \beta_{3,j} r_{m,t} + \beta_{4,j} r_{m,t+1} + \beta_{5,j} r_{m,t+2} + \varepsilon_{i,t} \quad (1)$$

Where $r_{i,t}$ is the return of firm i in week t, and $r_{m,t}$ is the return on the CSMAR current-value-weighted market return in week t. The lead and lag terms for the market index return is included,

[21] The CEO data is available for approximately 30% of our sample. For this sample, we calculate *LnVPSTD* using the pay differentials between the total compensation of top executives and the CEO. However, for the remaining observations without CEO compensation data, we calculate *LnVPSTD* using top executive compensation data retrieved directly from the CSMAR.

to allow for non-synchronous trading (Dimson, 1979). The firm-specific weekly return for firm *i* in week *t* ($w_{i,t}$) is computed as the natural logarithm of one plus the residual return from equation (1) above. In estimating equation (1), each firm-year is required to have at least 26 weekly stock returns.

Our first approach to stock price crash risk is the negative conditional skewness of firm-specific weekly returns over the financial year (*NCSKEW*). *NCSKEW* is computed by taking the negative of the third moment of firm-specific weekly returns for each year and dividing it by the standard deviation of firm-specific weekly returns raised to the third power. For each firm *i* in year *t*, *NCSKEW* is calculated as:

$$\mathrm{NCSKEW} = -\left[\mathrm{n}(\mathrm{n}-1)^{3/2}\sum \mathrm{w}^3{}_{\mathrm{i,t}}\right] / \left[(\mathrm{n}-1)(\mathrm{n}-2)\left(\sum \mathrm{w}^2{}_{\mathrm{i,t}}\right)^{3/2}\right] \qquad (2)$$

where n is the number of observations on firm-specific weekly returns of firm i during year t.

Our second measure of crash risk is the down-to-up volatility measure (*DUVOL*) of the crash likelihood. For each firm *i* over a fiscal-year period *t*, firm-specific weekly returns are separated into two groups: "down" weeks when the returns are below the annual mean, and "up" weeks when the returns are above the annual mean. The standard deviation of firm-specific weekly returns is calculated separately for each of these two groups. *DUVOL* is the natural logarithm of the ratio of the standard deviation in the "down" weeks to the standard deviation in the "up" weeks:

$$\mathrm{DUVOL}_{\mathrm{i,t}} = \log\left\{\left[(\mathrm{n_u}-1)\sum_{\mathrm{Down}} \mathrm{w}^2{}_{\mathrm{i,t}} / (\mathrm{n_d}-1)\sum_{\mathrm{Up}} \mathrm{w}^2{}_{\mathrm{i,t}}\right]\right\} \qquad (3)$$

A higher value of *DUVOL* indicates greater crash risk. As suggested in Chen et al. (2001), *DUVOL* does not involve third moments and, hence, is less likely to be overly influenced by extreme weekly returns.

Our third measure of crash risk captures the likelihood of an idiosyncratic firm crash in a calendar year (Hutton et al., 2009). Specifically, *CRASH_DUM* is a dummy variable taking

the value of one if the firm has a stock price crash in any given week in a fiscal year and zero otherwise. The crash week is defined in a given fiscal year for a firm in which the firm-specific weekly return falls 3.09 or more standard deviations below the mean firm-specific weekly return over year t. The *CRASH_DUM* is calculated following equation (4) below (Kim et al., 2011a).

$$w_{i,t} \leqslant Average\ (W_{i,t}) - 3.09\sigma_{i,t} \qquad (4)$$

Where *Average* $(w_{i,t})$ is the mean firm-specific weekly return over year t. $\sigma_{i,t}$ is the standard deviation of the mean firm-specific weekly return over year t.

4.4.3 Empirical model

To investigate the impact of tournament incentives on price crash, we use the regression models as shown below:

$$\begin{aligned} CRASH_{i,t+1} = {} & \alpha_0 + \beta_1 LnGAP_{i,t} + \beta_2 CRASH_{i,t} + \beta_3 RET_{i,t} + \beta_4 SDRET_{i,t} + \beta_5 TURN_{i,t} \\ & + \beta_6 SIZE_{i,t} + \beta_7 LEV_{i,t} + \beta_8 ROA_{i,t} + \beta_9 MB_{i,t} + \beta_{10} YEAR_{i,t} \\ & + \beta_{11} INDUSTRY_{i,t} + \varepsilon_{i,t} \end{aligned} \qquad (1.1)$$

$$\begin{aligned} CRASH_{i,t+1} = {} & \alpha_0 + \beta_1 LnGAP_{i,t} + \beta_2 CRASH_{i,t} + \beta_3 RET_{i,t} + \beta_4 SDRET_{i,t} + \beta_5 TURN_{i,t} \\ & + \beta_6 SIZE_{i,t} + \beta_7 LEV_{i,t} + \beta_8 ROA_{i,t} + \beta_9 MB_{i,t} + \beta_{10} |DAC|_{i,t} + \beta_{11} |REM|_{i,t} \\ & + \beta_{12} CSCORE_{i,t} + \beta_{13} YEAR_{i,t} + \beta_{14} INDUSTRY_{i,t} + \varepsilon_{i,t} \end{aligned} \qquad (1.2)$$

$$\begin{aligned} CRASH_{i,t+1} = {} & \alpha_0 + \beta_1 LnGAP_{i,t} + \beta_2 CRASH_{i,t} + \beta_3 RET_{i,t} + \beta_4 SDRET_{i,t} + \beta_5 TURN_{i,t} \\ & + \beta_6 SIZE_{i,t} + \beta_7 LEV_{i,t} + \beta_8 ROA_{i,t} + \beta_9 MB_{i,t} + |DAC|_{i,t} + \beta_{11} |REM|_{i,t} \\ & + \beta_{12} CSCORE_{i,t} + \beta_{13} BISZE_{i,t} + \beta_{14} BIND_{i,t} + \beta_{15} DUAL_{i,t} + \beta_{16} SOE_{i,t} \\ & + \beta_{17} MOWN_{i,t} + \beta_{18} IOWN_{i,t} + \beta_{19} AUDIT_{i,t} + \beta_{20} CAP_{i,t} + \beta_{21} GOV_{i,t} \\ & + \beta_{22} LEGAL_{i,t} + \beta_{23} YEAR_{i,t} + \beta_{24} INDUSTRY_{i,t} + \varepsilon_{i,t} \end{aligned} \qquad (1.3)$$

where, CRASH risk is proxied by *NCSKEW*, *DUVOL*, and *CRASH_DUM*, following equations (2) to (4) above. The independent variables are calculated using data from the preceding year, as is consistent with the crash risk literature. We first control for the lag value of *CRASH*, in order to account for the potential serial correlation in the crash proxies. *LnGAP* is our primary proxy for tournament incentives. Inclusion of the other control variables follows prior literature on the determinants of crash risk (Hutton et al., 2009; Kim et al., 2011a, b).

Chen et al. (2001) suggest that past firm returns are linked to future crash risk because the bubble built up by past returns is typically followed by a sudden drop in prices. For this reason, we include past one-year weekly returns (*RET*). Chen et al. (2001) also highlight that negative return skewness is higher for firms of larger size. *SDRET* is calculated as the standard deviation of firm-specific weekly returns over the year, and indicates stock volatility, as more volatile stocks are likely to be more crash prone. *TURN* is the average monthly share turnover for the current year minus the average monthly share turnover for the previous year, where monthly share turnover is computed as the monthly trading volume divided by the total number of shares outstanding during that month. Chen et al. (2001) indicate that this variable is used to measure differences of opinion among investors, and it is related, significantly and positively, to the proxies for firm-level crash risk.

To control for the size effect, we include *SIZE*, calculated as the natural log of a firm's total assets. *LEV* is the total long-term debt divided by total assets, and is expected to be associated with price crash positively. *ROA*, calculated as net income divided by total assets, is included in the model to control for the profitability effect on crash risk. The variable *MB* is the market value of shareholder's equity divided by the book value of shareholder's equity. Previous studies show that growth stocks are more prone to crash risk (Chen et al., 2001; Hutton et al., 2009). Equation (5.2) expands Equation (5.1) by including three proxies for financial reporting quality: namely, the absolute value of discretionary accruals (|*DAC*|), the absolute values of real earnings management (|*REM*|), and the firm-specific conservatism score (*CSCORE*) (detailed calculation procedures are explained in Appendix B).

Equations (5.3) further include firm-level corporate governance and provincial governance variables, including board characteristics (*BSIZE* and *BIND*), ownership characteristics (*SOE*, *MOWN* and *IOWN*), CEO duality (*DUAL*), and audit characteristics (*AUDIT*). We also include provincial development indicators as some additional control

variables (Lee & Wang, 2017). Three such variables are included, namely stock market development (*CAP*), government intervention in business (*GOV*) and legal enforcement of property rights (*LEGAL*). A list of definitions of all variables is provided in Appendix A. We also include industry and year dummies to control for industry and time fixed effects, respectively. To alleviate concerns about potential cross-sectional and time-series dependence in the data, we report t-values based on robust standard errors clustered by firm.

4.5 Sample selection and descriptive statistics

4.5.1 Sample selection

We start with Chinese A-share listed companies for the period spanning 2007–2016. The tournament data from the CSMAR personnel characteristics database and financial statement and stock returns data were collected from the CMASR database. The sample period starts from 2007 because Chinese regulations required companies to disclose information regarding executive compensation from 2006 and onward. We start with an initial sample of 16,535 firm-year observations. We, then, excluded 502 observations in the financial services industry, since they are under a different regulatory environment, and a further 5,547 observations with missing data on tournament incentives and fundamental determinants of price crash. We, therefore, derive an unbalanced panel dataset of 10,486 firm-year observations for 1,907 individual firms.

Table 4.1 shows the sample distribution across industries. Industries are categorized according to the Guidance on the Industry Category of Listed Companies issued by the CSRC in 2012. The top three industries are Manufacturing (59.82%), wholesale and retail (7.14%), and Real estate (6.08%), respectively.

Table 4.1: Full sample distribution across industry

Industry		N	%
A	Agriculture, forestry, animal husbandry and fishery	198	1.89%
B	Mining	325	3.10%
C	Manufacturing	6,273	59.82%
D	Industry of electric power, heat, gas and water production and supply	534	5.09%
E	Construction	334	3.19%
F	Wholesale and retail	749	7.14%
G	Transport, storage and postal service	398	3.80%
H	Accommodation and catering	49	0.47%
I	Information transmission, software and information technology services	421	4.01%
K	Real Estate	638	6.08%
L	Leasing and commercial service	115	1.10%
M	Scientific research and technical service	29	0.28%
N	Water conservancy, environment and public facility management	134	1.28%
P	Education	11	0.10%
Q	Health and social work	28	0.27%
R	Culture, sports and entertainment	131	1.25%
S	Diversified industries	119	1.13%
Total		10,486	100.00%

4.5.2 Descriptive statistics and correlation analysis

Panel A of Table 4.2 shows descriptive statistics for the regression variables. We winsorize the continuous variables at the 1% and 99% levels to reduce the possible impact of outliers. As shown in Panel A, the mean and median values of $NCSKEW_{t+1}$ are -0.33 and -0.29, respectively, whereas the mean and median of $DUVOL_{t+1}$ are -0.21 and -0.21, respectively. These statistics are similar to the estimates of a number of Chinese stock price crash risk studies (Chen et al., 2015a; Huang et al., 2017; Sun et al., 2017; Xu et al., 2014). The mean of $CRASH\_DUM_{t+1}$ is 0.074 implying that about 7.4 percent of our sample firms have experienced at least one crash week per year: an average that is close to that found by Chen et al. (2017b). The mean (median) value of *LnGAP* is 11.51 (11.59), with an interquartile range of 10.88 to 12.23. The alternative tournament incentives variable, *LnVPSTD* has a mean (median) value of 10.97 (11.10), with an interquartile range of 10.31 to 11.76. The average change in monthly trading volume (as a percentage of shares outstanding) is 0.038. The average firm in our sample has a firm-specific weekly return of -14.4 percent, weekly return volatility

of 0.05, a leverage of 0.50, profitability of 4.1 percent, and a market-to-book ratio of 3.10. The mean value of above basic control variables is similar to that in previous studies (Zhang et al., 2017). The average absolute value of discretionary accruals (|*DAC*|) is 0.07 while that of |*REM*| is 0.15. About 56 percent of firm-year observations are government-owned (SOE) and about 52 percent of the firm-year observations employ one of the Big 10 auditors.

Table 4. 2: Descriptive statistics and correlation analysis

Panel A: Descriptive statistics

Variable	N	Mean	Std. Dev.	25th Pctl.	Median	75th Pctl.
$NCSKEW_{t+1}$	10,486	-0.334	0.702	-0.725	-0.288	0.113
$DUVOL_{t+1}$	10,486	-0.213	0.340	-0.439	-0.209	0.015
$NCSKEW_t$	10,486	-0.300	0.681	-0.680	-0.264	0.129
$DUVOL_t$	10,486	-0.200	0.334	-0.421	-0.200	0.021
$CRASH\_DUM_{t+1}$	10,486	0.074	0.263	0.000	0.000	0.000
$LnGAP_t$	10,486	11.510	1.057	10.880	11.590	12.230
$LnVPSTD_t$	9,756	10.970	1.162	10.310	11.110	11.760
Firm-level controls						
RET_t	10,486	-0.144	0.117	-0.183	-0.110	-0.066
$SDRET_t$	10,486	0.051	0.019	0.037	0.047	0.061
$TURN_t$	10,486	0.038	0.234	-0.100	0.017	0.172
$SIZE_t$	10,486	22.150	1.004	21.440	22.050	22.750
LEV_t	10,486	0.495	0.210	0.339	0.500	0.648
ROA_t	10,486	0.041	0.064	0.012	0.035	0.068
MB_t	10,486	3.098	2.918	1.505	2.257	3.595
Financial reporting quality						
$\|DAC_t\|$	9,808	0.070	0.078	0.021	0.047	0.090
$\|REM_t\|$	9,808	0.149	0.142	0.047	0.105	0.199
$CSCORE_t$	9,808	0.038	0.047	0.005	0.035	0.071
Firm-governance controls						
$BSIZE_t$	9,743	2.186	0.198	2.079	2.197	2.197
$BIND_t$	9,743	0.368	0.052	0.333	0.333	0.400
$DUAL_t$	9,743	0.181	0.385	0.000	0.000	0.000
SOE_t	9,743	0.562	0.496	0.000	1.000	1.000
$MOWN_t$	9,743	0.028	0.090	0.000	0.000	0.001
$IOWN_t$	9,743	0.174	0.181	0.032	0.111	0.261
$AUDIT_t$	9,743	0.524	0.499	0.000	1.000	1.000
$EPERK_t$	4,714	-0.001	0.008	-0.005	-0.001	0.002
AH_t	4,714	0.709	0.287	0.480	0.800	1.000
$QFII_t$	4,714	0.115	0.319	0.000	0.000	0.000
ICW_t	4,714	6.396	0.896	6.467	6.535	6.579
Provincial-level controls						
CAP_t	9,743	0.838	1.458	0.208	0.328	0.654
GOV_t	9,743	6.733	2.654	5.410	7.020	9.320
$LEGAL_t$	9,743	22.397	19.295	4.790	12.22	39.66

Panel B: Correlation matrix

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*
1.NCSKEW$_{t+1}$	1.00																							
2.DUVOL$_{t+1}$	***0.96***	1.00																						
3.CRASH_DUM$_{t+1}$	***0.43***	***0.40***	1.00																					
4.LnGAP$_t$	***-0.04***	***-0.03***	***-0.03***	1.00																				
5.RET$_t$	***-0.03***	-0.01	***0.04***	***0.06***	1.00																			
6.SDRET$_t$	***0.05***	***0.03***	***-0.04***	***-0.08***	***-0.97***	1.00																		
7.TURN$_t$	***0.04***	***0.04***	0.00	-0.01	***-0.41***	***0.42***	1.00																	
8.SIZE$_t$	0.00	0.01	0.00	***0.32***	***-0.03***	0.01	***0.16***	1.00																
9.LEV$_t$	**0.02**	0.01	0.01	***-0.03***	***-0.03***	***0.04***	0.01	***0.03***	1.00															
10.ROA$_t$	***0.04***	***0.04***	0.02*	***0.18***	***0.08***	***-0.07***	***-0.06***	***0.26***	***-0.37***	1.00														
11.MB$_t$	***0.10***	***0.09***	***0.03***	***-0.06***	***-0.28***	***0.28***	***0.17***	***0.04***	***0.08***	***-0.03***	1.00													
12. |DAC|$_t$	***0.04***	***0.04***	0.02*	-0.02*	***-0.08***	***0.09***	***-0.04***	***-0.11***	***0.08***	0.00	***0.11***	1.00												
13.|REM|$_t$	0.02*	0.01	-0.01	***0.03***	***-0.06***	***0.07***	***-0.07***	0.00	***0.05***	***0.17***	***0.09***	***0.35***	1.00											
14.CSCORE$_t$	***-0.05***	-0.02*	0.00	***0.13***	***0.07***	***-0.12***	0.01	***0.29***	***0.19***	-0.01	***-0.07***	***-0.03***	***-0.09***	1.00										
15.BSIZE$_t$	-0.01	-0.01	0.00	0.00	***0.07***	***-0.07***	**-0.03**	***0.17***	***0.12***	0.01	***-0.08***	***-0.08***	***-0.03***	***0.08***	1.00									
16.BIND$_t$	0.00	-0.01	0.00	***0.04***	0.00	-0.01	0.01	***0.08***	0.00	-0.01	0.01	0.02	0.01	***0.04***	***-0.39***	1.00								
17.DUAL$_t$	**0.02**	0.02*	0.01	***0.07***	**-0.02**	**0.02**	0.00	***-0.07***	***-0.12***	***0.04***	***0.03***	0.00	0.00	***-0.04***	***-0.18***	***0.10***	1.00							
18.SOE$_t$	-0.01	0.00	0.00	***-0.13***	***0.04***	***-0.05***	0.00	***0.15***	***0.22***	***-0.12***	***-0.07***	***-0.07***	***-0.04***	***0.08***	***0.25***	***-0.06***	***-0.25***	1.00						
19.MOWN$_t$	0.00	0.00	0.01	***0.06***	-0.01	0.01	-0.01	***-0.10***	***-0.22***	***0.12***	***-0.05***	-0.02*	***-0.03***	***-0.05***	***-0.12***	***0.07***	***0.36***	***-0.34***	1.00					
20.IOWN$_t$	***0.04***	***0.04***	-0.01	***0.14***	0.01	-0.01	**-0.02**	***0.21***	-0.01	***0.15***	***0.04***	**-0.02**	***0.05***	***0.07***	***0.08***	0.00	0.01	***0.05***	***-0.10***	1.00				
21.AUDIT$_t$	***-0.04***	***-0.03***	-0.01	***0.13***	***0.07***	***-0.09***	0.00	***0.19***	0.00	0.02*	***-0.05***	***-0.06***	***-0.06***	***0.07***	0.01	**0.02**	**0.02**	0.01	***0.03***	***0.03***	1.00			
22.CAP$_t$	0.02*	0.02*	0.00	***0.09***	***-0.06***	***0.06***	***0.07***	***0.19***	***-0.03***	***0.07***	**0.02**	0.01	0.02*	0.02*	0.01	***0.03***	**-0.02**	***0.11***	0.00	***0.06***	**0.02**	1.00		
23.GOV$_t$	-0.02*	-0.01	0.01	***0.19***	0.01	-0.01	-0.01	**0.02**	***-0.10***	***0.10***	***-0.06***	**-0.02**	0.00	-0.01	***-0.05***	-0.02*	***0.08***	***-0.14***	***0.11***	0.01	***0.13***	***0.12***	1.00	
24.LEGAL$_t$	-0.01	0.00	0.01	***0.23***	**0.02**	***-0.03***	-0.01	***0.08***	***-0.12***	***0.10***	***-0.04***	***-0.02***	***-0.02***	0.01	***-0.06***	-0.01	***0.09***	***-0.17***	***0.13***	0.02*	***0.17***	***0.32***	***0.79***	1.00

Note: Table 2 shows the descriptive statistics for the crash risk measures, tournament incentives measure and control variables. Panel A of this table reports descriptive statistics and Panel B of this table presents a Pearson correlation matrix. Bold and italics indicates statistical significance at p<0.01; bold values indicate statistical significance at p<0.05; and * indicates statistical significance at p<0.10. All variables are defined in Appendix A.

Panel B of Table 4.2 shows the Pearson correlation matrix for the variables used in the basic regression models. All three crash measures are correlated negatively and significantly with *LnGAP* (correlation coefficients of -0.04 ($p<0.01$), -0.03 ($p<0.01$) and -0.03 ($p<0.01$) for *NCSKEW*, *DUVOL* and *CRASH_DUM* measures, respectively). Consistent with previous studies, control variables such as *SDRET*, *TURN*, and *MB* are correlated with price crash positively and significantly, whilst *RET* is correlated negatively (Piotroski et al., 2015; Xu et al., 2014). The correlations between all three crash measures and the earnings management variable, |*DAC*|, are positive and significant, whilst |*REM*| is correlated positively with *NCKSEW* only (Francis et al., 2016; Hutton et al., 2009). In contrast, the correlation with conditional conservatism (*CSCORE*) is negative and significant (Kim & Zhang, 2016). Besides, as expected, *BSIZE*, *BIND*, *SOE* and *AUDIT* are related to price crash negatively. At the same time, other corporate governance variables such as *DUAL*, *MOWN* and *IOWN* are correlated positively with price crash, which is largely consistent with prior studies (Chen et al., 2015; Huang et al., 2017).

4.6 Main test results

4.6.1 Baseline regressions: tournament incentives and price crash

Panel A of Table 4.3 reports the OLS regression results for hypotheses H1a and H1b, which investigates the effects of tournament incentives (*LnGAP*) on price crash. Columns (1) to (3) report the regression results for Equation (5.1). The coefficients of *LnGAP* are negative and significant for all three crash risk measures, suggesting that tournament incentives constrain future stock price crash (coefficients are -0.016 ($p<0.05$), -0.008 ($p<0.05$) and -0.126 ($p<0.01$) for the *NCSKEW*, *DUVOL* and *CRASH_DUM* measures, respectively). Thus, our results support hypothesis H1b, and reject hypothesis H1a. In terms of economic significance, the reported

coefficient implies that a one standard deviation increases in *LnGAP*, in year t, is associated with a 5.14 and 4.04 percent decreases in *NCSKEW* and *DUVOL*, respectively, in year t+1. We also estimate the marginal effect of *LnGAP* on *CRASH_DUM*, which is the expected decrease in the probability of a crash as a function of *LnGAP*, holding all other variables at their sample mean. The marginal effect is that for a 1% increase in *LnGAP*, the probability of a stock price crash decreases by 0.85%. Given that the unconditional probability of a crash in our sample is 7.04%, this result suggests that the association is economically significant as well ((0.85/7.04) *100). The sign and significance of most of the control variables are generally consistent with previous Chinese studies on price crash. For instance, the positive coefficients on *RET*, *SDRET*, *LEV*, *ROA* and *MB* are consistent with previous Chinese studies (Cao et al., 2016; Chen et al., 2018; Li et al., 2017; Xu et al., 2014). The negative coefficient on *TURN* is consistent with the Xu et al. (2014) and Li et al. (2017) findings.

Table 4.3: The effect of tournament incentives on the price crash

Panel A: Baseline regression

	Expected sign	(1) OLS $NCSKEW_{t+1}$	(2) OLS $DUVOL_{t+1}$	(3) LOGIT $CRASH\_DUM_{t+1}$	(4) OLS $NCSKEW_{t+1}$	(5) OLS $DUVOL_{t+1}$	(6) LOGIT $CRASH\_DUM_{t+1}$	(7) OLS $NCSKEW_{t+1}$	(8) OLS $DUVOL_{t+1}$	(9) LOGIT $CRASH\_DUM_{t+1}$
$NCSKEW_t$	+	0.071***		0.047	0.064***		0.020	0.061***		0.020
		[6.52]		[0.75]	[5.88]		[0.30]	[5.58]		[0.31]
$DUVOL_t$	+		0.065***			0.059***			0.057***	
			[6.18]			[5.63]			[5.44]	
$LnGAP_t$	-	-0.016**	-0.008**	-0.126***	-0.015**	-0.008**	-0.118***	-0.015**	-0.008**	-0.133***
		[-2.27]	[-2.34]	[-3.24]	[-2.11]	[-2.30]	[-2.89]	[-2.11]	[-2.36]	[-3.17]
RET_t	+	1.370***	0.620***	-1.108	1.362***	0.622***	-1.128	1.304***	0.599***	-1.203
		[5.08]	[4.84]	[-0.73]	[4.80]	[4.59]	[-0.69]	[4.59]	[4.40]	[-0.74]
$SDRET_t$	+	10.748***	4.621***	-12.728	10.297***	4.447***	-13.305	9.780***	4.208***	-13.785
		[6.37]	[5.78]	[-1.38]	[5.86]	[5.31]	[-1.35]	[5.56]	[5.01]	[-1.40]
$TURN_t$	-	-0.044	-0.008	-0.146	-0.043	-0.01	-0.221	-0.031	-0.004	-0.233
		[-1.17]	[-0.43]	[-0.71]	[-1.13]	[-0.52]	[-1.03]	[-0.81]	[-0.22]	[-1.07]
$SIZE_t$	-	0.011	0.006	-0.002	0.020**	0.010**	-0.010	0.020**	0.010**	0.009
		[1.25]	[1.50]	[-0.04]	[2.15]	[2.25]	[-0.19]	[1.98]	[2.04]	[0.15]
LEV_t	+	0.066*	0.025	0.148	0.075*	0.028	0.157	0.075*	0.031	0.215
		[1.65]	[1.32]	[0.71]	[1.84]	[1.41]	[0.68]	[1.83]	[1.51]	[0.91]
ROA_t	+	0.447***	0.201***	1.251*	0.409***	0.191***	1.533**	0.339***	0.157**	1.507*
		[3.57]	[3.31]	[1.75]	[3.21]	[3.05]	[2.04]	[2.68]	[2.52]	[1.94]
MB_t	+	0.014***	0.007***	0.028**	0.012***	0.006***	0.031**	0.012***	0.006***	0.033**
		[5.28]	[5.31]	[2.19]	[4.60]	[4.68]	[2.20]	[4.40]	[4.41]	[2.34]
$\|DAC_t\|$	+				0.145	0.102**	0.683	0.159	0.109**	0.796
					[1.46]	[2.13]	[1.25]	[1.59]	[2.26]	[1.43]
$\|REM_t\|$	+				0.026	-0.005	-0.469	0.018	-0.010	-0.508
					[0.50]	[-0.20]	[-1.49]	[0.34]	[-0.39]	[-1.58]
$CSCORE_t$	-				-0.961***	-0.394***	-1.444	-0.998***	-0.409***	-1.593
					[-4.41]	[-3.71]	[-1.09]	[-4.58]	[-3.84]	[-1.20]
$BSIZE_t$	-							-0.005	-0.011	0.114
								[-0.12]	[-0.56]	[0.50]
$BIND_t$	-							-0.022	-0.036	0.369

								[-0.14]	[-0.48]	[0.46]
DUAL$_t$	+							0.034*	0.014	0.072
								[1.73]	[1.43]	[0.66]
SOE$_t$	-							0.015	0.006	0.052
								[0.89]	[0.70]	[0.55]
MOWN$_t$	+							0.040	0.016	0.308
								[0.48]	[0.39]	[0.67]
IOWN$_t$	+							0.150***	0.076***	-0.204
								[3.48]	[3.54]	[-0.91]
AUDIT$_t$	-							-0.031**	-0.013*	-0.139
								[-2.00]	[-1.70]	[-1.62]
CAP$_t$	-/+							-0.005	-0.002	-0.017
								[-0.95]	[-0.63]	[-0.51]
GOV$_t$	-/+							-0.010**	-0.004*	0.038
								[-2.05]	[-1.75]	[1.32]
LEGAL$_t$	-/+							0.001**	0.001*	0.000
								[2.09]	[1.89]	[0.09]
Industry		YES	YES	YES	YES	YES	YES	YES	YES	YES
Year		YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant		-0.594***	-0.332***	-0.442	-0.710***	-0.379***	-0.352	-0.631***	-0.311***	-1.169
		[-3.01]	[-3.40]	[-0.40]	[-3.46]	[-3.74]	[-0.30]	[-2.75]	[-2.74]	[-0.89]
Observations		10,486	10,486	10,475	9,808	9,808	9,800	9,743	9,743	9,735
Adj. R-squared		0.060	0.060		0.060	0.060		0.070	0.060	
Pseudo R2				0.033			0.036			0.038

Panel B: Firm fixed effect models

	Expected sign	(1) $NCSKEW_{t+1}$	(2) $DUVOL_{t+1}$	(3) $CRASH\_DUM_{t+1}$	(4) $NCSKEW_{t+1}$	(5) $DUVOL_{t+1}$	(6) $CRASH\_DUM_{t+1}$	(7) $NCSKEW_{t+1}$	(8) $DUVOL_{t+1}$	(9) $CRASH\_DUM_{t+1}$
$NCSKEW_t$	+	-0.146***		-0.396***	-0.144***		-0.432***	-0.149***		-0.441***
		[-13.08]		[-6.54]	[-13.27]		[-6.68]	[-13.68]		[-6.68]
$DUVOL_t$	+		-0.148***			-0.147***			-0.149***	
			[-13.65]			[-14.12]			[-14.24]	
$LnGAP_t$	-	-0.047***	-0.022***	-0.176***	-0.036***	-0.019***	-0.118*	-0.033***	-0.017***	-0.114*
		[-4.33]	[-4.30]	[-2.86]	[-3.37]	[-3.54]	[-1.81]	[-3.00]	[-3.24]	[-1.74]
RET_t	+	1.356***	0.541***	-1.906	1.418***	0.664***	-1.55	1.301***	0.627***	-1.846
		[4.82]	[4.01]	[-1.09]	[4.69]	[4.55]	[-0.82]	[4.26]	[4.23]	[-0.96]
$SDRET_t$	+	8.138***	2.687***	-27.909***	8.066***	3.250***	-26.286**	6.628***	2.749***	-28.953**
		[4.71]	[3.24]	[-2.67]	[4.41]	[3.67]	[-2.32]	[3.54]	[3.03]	[-2.50]
$TURN_t$	-	0.013	0.021	0.184	0.035	0.028	0.109	0.03	0.025	0.071
		[0.37]	[1.24]	[0.86]	[1.01]	[1.60]	[0.49]	[0.86]	[1.42]	[0.31]
$SIZE_t$	-	0.067***	0.037***	0.322***	0.056***	0.032***	0.373***	0.069***	0.034***	0.380***
		[4.23]	[4.72]	[3.39]	[3.44]	[3.92]	[3.66]	[3.80]	[3.80]	[3.38]
LEV_t	+	0.116	0.046	0.901*	0.128	0.051	0.924*	0.151*	0.062	1.029**
		[1.38]	[1.14]	[1.89]	[1.48]	[1.19]	[1.81]	[1.74]	[1.45]	[1.97]
ROA_t	+	0.520***	0.267***	1.580*	0.630***	0.329***	2.138**	0.490***	0.272***	1.781*
		[3.18]	[3.36]	[1.75]	[3.83]	[4.09]	[2.20]	[2.96]	[3.34]	[1.80]
MB_t	+	0.011***	0.006***	0.031*	0.013***	0.007***	0.033	0.011***	0.006***	0.029
		[3.00]	[3.09]	[1.65]	[3.08]	[3.27]	[1.61]	[2.76]	[3.02]	[1.38]
$\|DAC_t\|$	+				0.307***	0.193***	0.963	0.303***	0.190***	1.058
					[2.72]	[3.53]	[1.48]	[2.69]	[3.49]	[1.60]
$\|REM_t\|$	+				-0.07	-0.067**	-0.766*	-0.087	-0.074**	-0.856**
					[-1.11]	[-2.11]	[-1.79]	[-1.38]	[-2.35]	[-1.98]
$CSCORE_t$	-				-0.428***	-0.030	-0.210	-0.448***	-0.037	-0.532
					[-2.60]	[-0.38]	[-0.21]	[-2.72]	[-0.47]	[-0.54]
$BSIZE_t$	-							0.196**	0.088**	0.653
								[2.26]	[2.11]	[1.10]
$BIND_t$	-							0.266	0.124	1.735
								[1.06]	[1.02]	[1.06]
$DUAL_t$	+							0.057*	0.025	0.203
								[1.69]	[1.54]	[1.12]
SOE_t	-							0.022	0.017	-0.105
								[0.35]	[0.57]	[-0.28]
$MOWN_t$	+							0.082	0.026	-0.558

								[0.39]	[0.25]	[-0.43]
IOWN$_t$	+							0.137*	0.072*	0.186
								[1.68]	[1.76]	[0.39]
AUDIT$_t$	-							-0.042*	-0.012	-0.251*
								[-1.76]	[-0.99]	[-1.66]
CAP$_t$	-/+							0.063***	0.030***	0.210**
								[3.73]	[3.65]	[2.15]
GOV$_t$	-/+							0.044	0.019	-0.054
								[0.91]	[0.89]	[-0.28]
LEGAL$_t$	-/+							-0.005**	-0.001	0.008
								[-2.35]	[-1.39]	[0.60]
Industry		YES	YES	YES	YES	YES	YES	YES	YES	YES
Year		YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant		-1.657***	-0.924***		-1.541***	-0.874***		-2.607***	-1.302***	
		[-4.69]	[-5.25]		[-4.24]	[-4.82]		[-4.56]	[-4.71]	
Observations		10,486	10,486	3,855	9,808	9,808	3,445	9,743	9,743	3,403
Adj. R-squared		0.030	0.030		0.03	0.04		0.040	0.040	
Pseudo R2				0.041			0.049			0.055

Note: This table presents the OLS and the fixed effect regression results of the effect of tournament incentives on crash risk. When crash risk is measured by *CRASH-DUM*, a logit regression and conditional logit are used. The study period is from 2007 to 2016. The t -statistics shown in brackets are based on standard errors clustered by firm. ∗, ∗∗, and ∗∗∗ indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Definitions of all variables are in Appendix A.

Columns (4) to (6) extend the baseline regression model by including three financial reporting quality variables, namely, |*DAC*|, |*REM*| and *CSCORE*. The coefficients on *CSCORE* are negative and significant when crash risk is proxied by *NCSKEW* and *DUVOL*, implying that conditional conservatism reduces price crash (Cao et al., 2016). The coefficients on |*DAC*| are positive and significant for the $DUVOL_{t+1}$ measure alone, while those on |*REM*| are insignificant. Importantly the coefficients on *LnGAP* continue to be negative and significant. Finally, columns (7) to (9) include a set of firm-level and provincial-level governance variables. When crash risk is measured by *NCSKEW*, the coefficient on *DUAL* is positive and significant, indicating that powerful CEOs are able conceal negative news from investors, thus increasing the incidence of future price crash (coefficients is 0.034 ($p<0.10$) (Chen et al., 2015a). The coefficients on *IOWN* are found to be positive and significant as well. One plausible explanation for this finding could be attributed to the informational advantages of institutional investors, who might 'vote with their feet' once they think the firm's financial performance will worsen (Parrino et al., 2003), thus increasing the risk of price crash. The coefficients on *AUDIT* are negative and significant suggesting that high quality auditing reduces future price crash (Robin & Zhang, 2015). In addition, the results indicate that government intervention and the legal system do affect crash risk. The coefficients on *GOV* are negative and significant; suggesting that less government intervention encourages disclosure transparency and, hence, reduces the risk of price crash. Strong legal enforcement, however, does not induce managers to disclose bad news in a timelier manner (Lee & Wang, 2017).

In addition, we include firm fixed effects to account for unobservable, time invariant, firm-specific factors that may affect price crash. Results are reported in Panel B of Table 4.3. Results are consistent with those reported using the OLS specification. Results in columns (1) to (9) suggest that the coefficients on *LnGAP* for all three crash measures are negative and significant. For example, the coefficients are -0.033 ($p<0.01$), -0.017 ($p<0.01$) and -0.011

(p<0.10) for *NCSKEW* (column 7), *DUVOL* (column 8) and *CRASH_DUM* (column 9), respectively. Overall, the results in panels A and B of Table 4.3 show the constraining effect of tournament incentives on price crash.

4.6.2 Robustness tests: alternative measures of tournament incentives, crash risk, and additional controls

In our base line regression, we define tournament incentives as the natural logarithm of the average pay gap between the top three executives and the remaining executives. In the sensitivity analysis, we re-estimate the regression using another variant of tournament incentive: the natural logarithm of the standard deviation of the pay difference among VPs, excluding the CEO's compensation (*LnVPSTD*) (see footnote 3 for measurement procedure). The relationship between tournament incentives and crash risk remains negative and significant for *LnVPSTD* as well (e.g. coefficient -0.013 (p<0.10), -0.007 (p<0.05) and -0.085 (p<0.05) for *NCSKEW* (column 1), *DUVOL* (column2) and *CRASH_DUM* (column 3), in Table 4.4).

Second, we also use an alternative stock price crash risk measure to test the robustness of the reported results. Following Hutton et al. (2009) and Chen et al. (2001), we use *CRASH_NUM*, the total number of crash weeks in a calendar year, to evaluate the occurrence of a crash for firm i over year t. The ordered logit regression is used, and the regression result is shown in column (4) of Table 4.4. The coefficient on *LnGAP* is negative and significant (coefficient is -0.133, p< 0.01).

Table 4.4: Robustness test

	Tournament incentives=*LnVPSTD*			Alternative crash risk measure		Additional controls	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$CRASH\_DUM_{t+1}$	$CRASH\_NUM_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$CRASH\_DUM_{t+1}$
$NCSKEW_t$	0.060***		0.033	0.020	0.068***		0.152
	[5.29]		[0.49]	[0.31]	[4.21]		[1.57]
$DUVOL_t$		0.057***				0.069***	
		[5.22]				[4.47]	
$\boldsymbol{LnGAP_t}$				-0.133***	-0.024**	-0.013**	-0.232***
				[-3.17]	[-2.18]	[-2.44]	[-3.83]
$\boldsymbol{LnVPSTD_t}$	-0.013*	-0.007**	-0.085**				
	[-1.86]	[-2.05]	[-2.26]				
RET_t	1.225***	0.567***	-1.74	-1.203	1.023***	0.458**	-2.585
	[4.26]	[4.10]	[-1.04]	[-0.74]	[2.60]	[2.53]	[-1.18]
$SDRET_t$	9.317***	3.986***	-14.772	-13.813	8.587***	3.706***	-17.951
	[5.23]	[4.67]	[-1.45]	[-1.40]	[3.76]	[3.50]	[-1.41]
$TURN_t$	-0.019	0.001	-0.177	-0.232	-0.104	-0.041	0.071
	[-0.48]	[0.07]	[-0.76]	[-1.07]	[-1.61]	[-1.32]	[0.19]
$SIZE_t$	0.022**	0.011**	-0.016	0.009	0.046***	0.026***	0.032
	[2.18]	[2.21]	[-0.27]	[0.15]	[2.74]	[3.19]	[0.33]
LEV_t	0.072*	0.028	0.165	0.212	0.114*	0.052	0.212
	[1.69]	[1.33]	[0.66]	[0.89]	[1.66]	[1.58]	[0.54]
ROA_t	0.352***	0.155**	1.530*	1.506*	0.276	0.105	1.008
	[2.67]	[2.38]	[1.84]	[1.94]	[1.21]	[0.94]	[0.74]
MB_t	0.011***	0.006***	0.014	0.033**	0.014**	0.006**	0.033
	[3.92]	[4.03]	[0.86]	[2.35]	[2.37]	[2.19]	[0.98]
$\lvert DAC_t \rvert$	0.151	0.105**	0.758	0.794	0.357**	0.207***	1.409*
	[1.44]	[2.08]	[1.31]	[1.42]	[2.26]	[2.71]	[1.65]
$\lvert REM_t \rvert$	0.027	-0.006	-0.53	-0.504	-0.063	-0.061	-0.860*
	[0.51]	[-0.23]	[-1.53]	[-1.57]	[-0.76]	[-1.48]	[-1.75]
$CSCORE_t$	-1.099***	-0.445***	-1.883	-1.581	-1.865***	-0.890***	-2.08
	[-4.82]	[-3.99]	[-1.32]	[-1.19]	[-4.88]	[-4.83]	[-0.90]
$BSIZE_t$	-0.015	-0.015	0.122	0.113	-0.01	-0.012	-0.004
	[-0.36]	[-0.77]	[0.52]	[0.50]	[-0.17]	[-0.45]	[-0.01]
$BIND_t$	-0.051	-0.048	0.489	0.363	0.141	0.052	1.953*
	[-0.31]	[-0.60]	[0.57]	[0.45]	[0.65]	[0.51]	[1.75]
$DUAL_t$	0.043**	0.018*	0.102	0.073	0.031	0.006	-0.009
	[2.04]	[1.74]	[0.89]	[0.67]	[1.09]	[0.46]	[-0.05]
SOE_t	0.021	0.009	0.099	0.052	0.025	0.009	-0.193
	[1.16]	[0.96]	[0.99]	[0.55]	[1.00]	[0.74]	[-1.34]
$MOWN_t$	0.041	0.018	0.328	0.306	0.123	0.062	0.075

	[0.48]	[0.43]	[0.71]	[0.67]	[1.14]	[1.14]	[0.12]
$IOWN_t$	0.162***	0.082***	-0.157	-0.206	0.083	0.046*	-0.157
	[3.58]	[3.69]	[-0.67]	[-0.92]	[1.45]	[1.67]	[-0.45]
$AUDIT_t$	-0.033**	-0.013*	-0.204**	-0.138	-0.021	-0.011	-0.151
	[-2.05]	[-1.70]	[-2.28]	[-1.61]	[-0.96]	[-1.09]	[-1.20]
CAP_t	-0.004	-0.001	-0.013	-0.017	-0.010	-0.004	0.061
	[-0.77]	[-0.39]	[-0.36]	[-0.51]	[-1.14]	[-0.97]	[1.16]
GOV_t	-0.011**	-0.005*	0.020	0.038	-0.012*	-0.006*	0.069
	[-2.23]	[-1.84]	[0.67]	[1.32]	[-1.77]	[-1.85]	[1.48]
$LEGAL_t$	0.002**	0.001*	0.002	0.000	0.003***	0.001***	0.000
	[2.25]	[1.92]	[0.50]	[0.09]	[2.85]	[2.74]	[0.03]
Additional controls							
$EPERK_t$					-1.561	-1.252**	1.253
					[-1.23]	[-2.08]	[0.18]
AH_t					-0.152***	-0.066***	0.013
					[-3.66]	[-3.31]	[0.05]
$QFII_t$					0.039	0.025*	-0.033
					[1.27]	[1.66]	[-0.17]
ICW_t					-0.000***	-0.000***	-0.001*
					[-2.74]	[-2.74]	[-1.92]
INDUSTRY	YES	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES	YES
Constant	-0.683***	-0.343***	-1.018		-1.057**	-0.547***	0.2
	[-2.86]	[-2.94]	[-0.74]		[-2.52]	[-2.64]	[0.08]
Observations	9,059	9,059	9,051	9,743	4,714	4,714	4,711
Adj. R-squared	0.070	0.060			0.060	0.050	
Pseudo R^2			0.039	0.038			0.037

Note: Table 4 reports the analysis using alternative measures of tournament incentives (*LnVPSTD*) in columns (1) and (3), and crash risk (*CRASH_NUM*) in columns (4) which use ordered logit regression. Columns (5) and (7) show the analysis adding extra control variables that may potentially affect crash risk. The t –statistics reported in brackets are based on standard errors clustered by both firm and time. ∗, ∗∗, and ∗∗∗ indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All variables are defined in Appendix A.

Third, to mitigate concerns arising from omitted correlated variables, we further include excess perks (*EPERK*) (Xu et al., 2014), analyst herding (*AH*) (Xu et al., 2017b), qualified foreign institutional investors (*QFII*) (Cao et al., 2016), and internal control quality (*ICW*) (Chen et al., 2017b), as additional control variables. The findings are presented in columns (5) to (7) of Table 4.4. Although the additional control variables are found to be related to future price crash, the inclusion of these variables does not affect the sign and significance of *LnGAP*. The coefficients on *LnGAP* continue to be negative and significant across all models.

4.6.3 Endogeneity tests

Our analysis so far suggests a negative association between tournament incentives and price crash. However, the sign, magnitude, and statistical significance of these estimates may be biased if our regression estimates suffer from omitted variables, reverse causality, or model misspecification problems (Woolridge, 2002). Furthermore, our data reveals wide variation in the pay gap between the top three executives and the remaining executives among sample companies. Such variation could be the product of a non-random decision, and may be correlated with the error term of the price crash model, resulting in a selection bias. Such selection bias may violate the standard OLS assumptions, and the least squares coefficients of the tournament incentives variables could, therefore, be biased as well. Propensity score matching (PSM) methodology (Rosenbaum & Rubin, 1983, 1985) is a tool for controlling the potential self-selection problem by matching sample firms with control firms having similar characteristics according to a function of covariates. We use the nearest neighbour (NN), Radius and Kernel techniques to perform the PSM tests.

In our setting, the basic approach to PSM is to first model the determinants of variation in *LnGAP* among firms. We divide our sample into two groups based on the yearly median level of *LnGAP*. We consider the group with above-median *LnGAP* as the treated group, and

those with less-than-median *LnGAP* as the control group. We include a set of firm characteristics that may explain the variation in *LnGAP*, e.g., *SIZE*, *LEV*, *ROA*, *MB*, *BSIZE*, *BIND*, *DUAL*, *MOWN* and *IOWN* (Burns et al., 2017). We also include provincial-level variables, namely, *CAP*, *GOV* and *LEGAL*.[22] In addition, we include *SOE* because 56% of our sample observations are SOEs. Inclusion of these controls ensures a proper balance between treated and control subjects in the matched sample, which is a key criterion for PSM (Austin, 2011). One important function of PSM is to examine the distribution of measured baseline covariates between treated and control subjects. If there are no systematic differences in the baseline covariates between these two groups after conditioning on the propensity score, the propensity-scoring model has been correctly specified (Austin, 2011).

Table 4.5: Propensity-matched technique

Panel A: Propensity-matched variables

	Nearest Neighbour (NN)				RADIUS				KERNEL			
Variable	Treated	Control	t-stat	p-value	Treated	Control	t-stat	p-value	Treated	Control	t-stat	p-value
$SIZE_t$	22.11	22.13	-0.92	0.36	22.41	22.39	1.22	0.22	22.41	22.38	1.85	0.07
LEV_t	0.49	0.48	0.56	0.57	0.49	0.48	1.12	0.26	0.49	0.48	1.18	0.24
ROA_t	0.04	0.04	-0.44	0.66	0.05	0.05	0.35	0.73	0.05	0.05	0.49	0.62
MB_t	2.98	2.99	-0.14	0.89	2.93	2.92	0.19	0.85	2.93	2.92	0.08	0.93
$BSIZE_t$	2.18	2.18	-0.44	0.66	2.19	2.18	1.35	0.18	2.19	2.18	1.45	0.15
$BIND_t$	0.37	0.37	0.38	0.71	0.37	0.37	-0.78	0.44	0.37	0.37	-0.84	0.40
$DUAL_t$	0.19	0.18	0.43	0.67	0.21	0.21	0.39	0.69	0.21	0.21	0.19	0.85
SOE_t	0.54	0.53	0.66	0.51	0.51	0.50	0.71	0.48	0.51	0.50	0.53	0.60
$MOWN_t$	0.03	0.03	0.13	0.90	0.03	0.03	-0.70	0.48	0.03	0.03	-0.67	0.50
$IOWN_t$	0.17	0.17	-0.26	0.80	0.19	0.19	0.55	0.58	0.19	0.19	0.83	0.40
CAP_t	0.83	0.83	0.23	0.82	0.95	0.99	-1.09	0.28	0.95	0.98	-0.80	0.42
GOV_t	6.78	6.84	-0.91	0.36	7.18	7.27	-1.69	0.09	7.18	7.24	-1.19	0.23
$LEGAL_t$	22.54	22.85	-0.69	0.49	26.48	27.26	-1.96	0.05	26.48	27.02	-1.36	0.18

[22]The regional economic development, level of government intervention, and legal enforcement vary significantly across provinces in China (Wang & Fan, 2004). Prior studies have confirmed that the regional institutional environment affects compensation in China (Firth et al., 2006) and, thus, may influence pay disparities.

Panel B: PSM regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	NN			RADIUS			KERNEL		
	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$CRASH\_DUM_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$CRASH\_DUM_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$CRASH\_DUM_{t+1}$
$NCSKEW_t$	0.064***		0.031	0.061***		0.020	0.061***		0.020
	[4.95]		[0.40]	[5.75]		[0.32]	[5.75]		[0.31]
$DUVOL_t$		0.066***			0.057***			0.057***	
		[5.28]			[5.55]			[5.55]	
LnGAPt	-0.018**	-0.009**	-0.115**	-0.015**	-0.008**	-0.129***	-0.015**	-0.008**	-0.133***
	[-2.08]	[-2.11]	[-2.29]	[-2.11]	[-2.39]	[-3.06]	[-2.12]	[-2.40]	[-3.14]
RET_t	1.282***	0.596***	-1.468	1.302***	0.597***	-1.223	1.306***	0.599***	-1.190
	[3.76]	[3.70]	[-0.75]	[4.62]	[4.41]	[-0.76]	[4.63]	[4.43]	[-0.74]
$SIGMA_t$	9.698***	4.289***	-11.513	9.792***	4.209***	-13.875	9.786***	4.208***	-13.661
	[4.55]	[4.26]	[-0.97]	[5.55]	[4.98]	[-1.40]	[5.55]	[4.98]	[-1.38]
$DTURN_t$	-0.005	0.007	-0.152	-0.032	-0.005	-0.249	-0.03	-0.004	-0.231
	[-0.11]	[0.32]	[-0.56]	[-0.82]	[-0.25]	[-1.11]	[-0.79]	[-0.21]	[-1.04]
$SIZE_t$	0.015	0.008	0.030	0.021**	0.010**	0.004	0.020**	0.010**	0.005
	[1.27]	[1.36]	[0.44]	[2.17]	[2.22]	[0.07]	[2.16]	[2.21]	[0.10]
LEV_t	0.095*	0.040	0.488	0.075*	0.031	0.204	0.077*	0.031	0.216
	[1.93]	[1.64]	[1.64]	[1.90]	[1.56]	[0.84]	[1.94]	[1.60]	[0.89]
ROA_t	0.522***	0.256***	2.404**	0.357***	0.166***	1.594**	0.337***	0.157**	1.516*
	[3.24]	[3.23]	[2.46]	[2.84]	[2.66]	[2.00]	[2.69]	[2.52]	[1.92]
MB_t	0.007**	0.004**	-0.007	0.011***	0.006***	0.033**	0.012***	0.006***	0.033**
	[2.07]	[2.37]	[-0.34]	[4.31]	[4.28]	[2.35]	[4.52]	[4.50]	[2.39]
$\|DAC_t\|$	0.044	0.047	0.577	0.156	0.107**	0.748	0.159*	0.109**	0.798
	[0.37]	[0.82]	[0.86]	[1.61]	[2.28]	[1.35]	[1.65]	[2.32]	[1.44]
$\|REM_t\|$	0.004	-0.02	-0.590	0.017	-0.011	-0.508	0.017	-0.01	-0.515
	[0.05]	[-0.62]	[-1.47]	[0.32]	[-0.42]	[-1.56]	[0.33]	[-0.40]	[-1.59]
$CSCORE_t$	-1.190***	-0.495***	-2.808	-0.999***	-0.409***	-1.542	-1.006***	-0.412***	-1.618
	[-4.30]	[-3.66]	[-1.62]	[-4.50]	[-3.74]	[-1.18]	[-4.54]	[-3.77]	[-1.23]
$BSIZE_t$	-0.046	-0.03	-0.075	-0.005	-0.011	0.112	-0.006	-0.012	0.116
	[-0.98]	[-1.33]	[-0.28]	[-0.12]	[-0.58]	[0.50]	[-0.16]	[-0.61]	[0.52]

BIND$_t$	-0.12	-0.067	1.053	-0.01	-0.031	0.388	-0.015	-0.033	0.395
	[-0.69]	[-0.80]	[1.08]	[-0.07]	[-0.45]	[0.49]	[-0.11]	[-0.49]	[0.50]
DUAL$_t$	0.036	0.014	0.094	0.034*	0.014	0.076	0.035*	0.014	0.075
	[1.57]	[1.21]	[0.72]	[1.82]	[1.53]	[0.70]	[1.85]	[1.56]	[0.69]
SOE$_t$	0.033*	0.014	0.042	0.014	0.006	0.056	0.015	0.006	0.057
	[1.71]	[1.44]	[0.37]	[0.90]	[0.73]	[0.60]	[0.97]	[0.79]	[0.61]
MOWN$_t$	0.015	-0.005	0.002	0.044	0.018	0.301	0.047	0.019	0.314
	[0.15]	[-0.09]	[0.00]	[0.52]	[0.43]	[0.65]	[0.56]	[0.47]	[0.68]
IOWN$_t$	0.141***	0.071***	-0.110	0.150***	0.076***	-0.196	0.150***	0.076***	-0.203
	[2.92]	[3.01]	[-0.39]	[3.82]	[3.94]	[-0.83]	[3.82]	[3.95]	[-0.86]
AUDIT$_t$	-0.044**	-0.019**	-0.185*	-0.032**	-0.014**	-0.146*	-0.031**	-0.013*	-0.140*
	[-2.54]	[-2.27]	[-1.85]	[-2.28]	[-1.96]	[-1.77]	[-2.18]	[-1.87]	[-1.70]
CAP$_t$	-0.006	-0.002	-0.044	-0.005	-0.002	-0.017	-0.005	-0.002	-0.016
	[-0.97]	[-0.62]	[-1.11]	[-1.03]	[-0.69]	[-0.54]	[-1.03]	[-0.70]	[-0.52]
GOV$_t$	-0.008	-0.003	0.046	-0.010**	-0.004**	0.037	-0.010**	-0.004**	0.038
	[-1.44]	[-1.30]	[1.34]	[-2.31]	[-1.98]	[1.35]	[-2.31]	[-1.98]	[1.39]
LEGAL$_t$	0.001	0.000	0.000	0.001**	0.001**	0.000	0.001**	0.001**	0.000
	[1.39]	[1.27]	[0.05]	[2.28]	[2.08]	[0.13]	[2.26]	[2.07]	[0.09]
INDUSTRY	YES	YES	YES	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	-0.38	-0.208	-1.808	-0.654***	-0.320***	-1.081	-0.646***	-0.316***	-1.117
	[-1.30]	[-1.45]	[-1.04]	[-2.97]	[-2.96]	[-0.83]	[-2.93]	[-2.93]	[-0.86]
Observations	6,692	6,692	6,687	9,725	9,725	9,717	9,735	9,735	9,727
Adj. R-squared	0.070	0.060		0.070	0.060		0.070	0.060	
Pseudo R2			0.041			0.038			0.038

Note: This table reports PSM regression results relating tournament incentives to the crash risk, and control variables, for Chinese listed firms from 2007 to 2016. Continuous variables are winsorized at their 1st and 99th percentiles. Robust t-statistics in brackets. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix A.

In Table 4.5, Panel A, the p-values for the t-test indicate that the matching algorithm was successful in achieving balance for all covariates. In particular, 12 of the 13 t-tests are statistically insignificant between the treated and the control sub-groups in all three PSM techniques. Panel B, Table 4.5 shows the PSM regression results for the NN (columns 1 to 3); Radius (columns 4 to 6) and Kernel (columns 7 to 9) methods. We find results that are consistent with the main results, i.e., the coefficients on *LnGAP* are negative and significant. Overall, the PSM analysis provides robust evidence about the negative association between tournament incentives and crash risk.

4.6.4 The mediating effect of financial reporting quality

So far, we have presented results indicating a significant negative relation between tournament incentives and the stock price crash risk. This result is robust, even after controlling for firm-level characteristics, firm and year-effects. A related issue, is the extent to which tournament incentives affect price crash directly (i.e., without mediation), and through its effect on financial reporting quality, the so-called mediation effect. The reason for choosing financial reporting quality as the mediating channel, is based on the observation that executives receiving cash compensation, including a short-term bonus, are often evaluated in terms of their earnings-based performance, and this incentivizes them to manipulate financial statements in order to report higher earnings. As discussed in Section 4.3, previous studies have found an association between tournament incentives and financial reporting quality (Chen et al., 2016; Park, 2017; Zhang et al., 2018). There is also ample evidence linking financial reporting quality with price crash (Habib et al., 2018). Therefore, we expect financial reporting quality to mediate the

association between tournament incentives and price crash. We choose three financial reporting quality variables, namely |*DAC*|, |*REM*| and *CSCORE*.[23]

We follow the mediation test approach of Baron and Kenny (1986), who propose that a mediation effect exists when the following three conditions are fulfilled: (1) Path A: Variations in the levels of the independent variable (i.e., tournament incentives (*LnGAP*) in our study) account significantly for variations in the proposed mediators (i.e., |*DAC*|, |*REM*| and *CSCORE*) (Equation 6A below); (2) Path B: Variations in the proposed mediators account significantly for variations in the dependent variable ($NCSKEW_{t+1}$ and $DUVOL_{t+1}$); and (3) Path C: The significant relationship between *LnGAP* and $NCSKEW_{t+1}$ or $DUVOL_{t+1}$ becomes insignificant once Paths A and B are controlled (full mediation); or the significant relation is reduced once Paths A and B are controlled (partial mediation) (Equation 6B below). The following set of equations is developed to conduct the mediation tests:

$$MV = \alpha_0 + \alpha_1 * LnGAP_t + \sum Controls_t + \sum Industry_t + \sum Year + \varepsilon_{i,t} \quad (6A)$$

$$NCSKEW\ or DUVOL_{t+1} = \gamma_0 + \gamma_1 * LnGAP_t + \gamma 2 * MV_t + \sum Controls_t + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (6B)$$

Where *MV* are the three mediating variables and other variables are defined as before. The total effect of *LnGAP* on price crash can be decomposed into direct and indirect effects. We tabulate the direct and indirect effects in Table 4.6.

[23] Zhang et al. (2018) tests the association between tournament incentives and the likelihood of accounting restatements. However, we did not test the mediating effect of restatements, because of a very small sample (only about 1,000 observations).

Table 4.6: The mediating effect of financial reporting quality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Eq. (6A)	*Eq. 6(B)*	*Eq. 6(B)*	*Eq. (6A)*	*Eq. 6(B)*	*Eq. 6(B)*	*Eq. (6A)*	*Eq. 6(B)*	*Eq. 6(B)*
	$\|DAC_t\|$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$\|REM_t\|$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$CSCORE_t$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$
$NCSKEW_t$		0.059***			0.059***			0.061***	
		[5.39]			[5.39]			[5.97]	
$DUVOL_t$			0.049***			0.049***			0.036***
			[4.46]			[4.46]			[3.58]
$LnGAP_t$	-0.001	-0.015**	-0.008**	0.002	-0.015**	-0.008**	0.002***	-0.015**	-0.012***
	[-1.45]	[-2.03]	[-2.27]	[1.59]	[-2.03]	[-2.27]	[4.56]	[-2.13]	[-3.54]
$\|DAC_t\|$		0.086	0.068	0.540***	0.086	0.069		0.159*	0.173***
		[0.87]	[1.40]	[29.57]	[0.87]	[1.41]		[1.66]	[3.74]
$\|REM_t\|$	0.171***	0.019	-0.009		0.019	-0.009		0.018	-0.069***
	[29.57]	[0.33]	[-0.31]		[0.33]	[-0.32]		[0.33]	[-2.68]
$CSCORE_t$		-1.103***	-0.480***		-1.103***	-0.480***		-0.998***	-0.083
		[-4.50]	[-4.00]		[-4.50]	[-4.00]		[-4.58]	[-1.07]
RET_t		1.986***	0.976***		1.986***	0.976***		1.304***	0.636***
		[5.96]	[5.98]		[5.96]	[5.98]		[4.89]	[4.92]
$SIGMA_t$		13.079***	5.977***		13.079***	5.977***		9.780***	3.380***
		[6.78]	[6.32]		[6.78]	[6.32]		[5.84]	[4.28]
$DTURN_t$		-0.007	0.003		-0.007	0.003		-0.031	0.065***
		[-0.16]	[0.17]		[-0.16]	[0.17]		[-0.81]	[4.05]
$SIZE_t$	-0.008***	0.032***	0.016***	0.006***	0.032***	0.016***	0.012***	0.020**	-0.002
	[-7.50]	[3.16]	[3.28]	[3.47]	[3.16]	[3.28]	[24.13]	[2.11]	[-0.38]
LEV_t	0.018***	0.070*	0.032	0.036***	0.070*	0.032	0.041***	0.075*	0.038**
	[4.04]	[1.65]	[1.53]	[4.64]	[1.65]	[1.53]	[17.34]	[1.90]	[2.06]
ROA_t	-0.003	0.309**	0.149**	0.432***	0.309**	0.149**	-0.018**	0.339***	0.324***
	[-0.20]	[2.29]	[2.26]	[16.47]	[2.29]	[2.26]	[-2.27]	[2.66]	[5.26]
MB_t	0.002***	0.015***	0.007***	0.005***	0.015***	0.007***	-0.001***	0.012***	0.010***
	[6.26]	[5.16]	[5.24]	[8.91]	[5.16]	[5.24]	[-9.36]	[4.62]	[7.91]
OCF	-0.058***			-0.014					
	[-5.28]			[-0.73]					
$BSIZE_t$	-0.016***	-0.009	-0.012	-0.002	-0.009	-0.012	0.004*	-0.005	0.001
	[-3.48]	[-0.21]	[-0.61]	[-0.23]	[-0.21]	[-0.61]	[1.71]	[-0.12]	[0.05]
$BIND_t$	-0.010	-0.034	-0.041	-0.003	-0.034	-0.041	0.023**	-0.022	-0.033
	[-0.63]	[-0.23]	[-0.55]	[-0.09]	[-0.23]	[-0.55]	[2.41]	[-0.16]	[-0.46]
$DUAL_t$	-0.003	0.036*	0.015	0.003	0.036*	0.015		0.034*	0.018*
	[-1.23]	[1.79]	[1.49]	[0.75]	[1.79]	[1.49]		[1.79]	[1.93]
SOE_t	-0.008***	0.000	-0.002	-0.000	0.000	-0.002	0.000	0.015	0.004
	[-4.61]	[0.02]	[-0.23]	[-0.03]	[0.02]	[-0.23]	[-0.36]	[0.97]	[0.46]

MOWN$_t$	-0.008	0.022	0.013	-0.012	0.022	0.013		0.040	-0.003
	[-0.78]	[0.23]	[0.28]	[-0.68]	[0.23]	[0.28]		[0.47]	[-0.08]
IOWN$_t$	-0.005	0.165***	0.079***	0.011	0.165***	0.079***	0.004*	0.150***	0.064***
	[-1.07]	[3.99]	[3.89]	[1.38]	[3.99]	[3.89]	[1.68]	[3.85]	[3.36]
AUDIT$_t$	-0.004**	-0.024	-0.010	-0.008***	-0.024	-0.010	0.001	-0.031**	-0.017**
	[-2.25]	[-1.59]	[-1.40]	[-2.65]	[-1.59]	[-1.40]	[0.82]	[-2.19]	[-2.44]
CAP$_t$		-0.003	-0.001		-0.003	-0.001		-0.005	[-0.08]
		[-0.63]	[-0.30]		[-0.63]	[-0.30]		[-0.99]	0.002
GOV$_t$		-0.011**	-0.005**		-0.011**	-0.005**		-0.010**	[0.76]
		[-2.44]	[-2.30]		[-2.44]	[-2.30]		[-2.28]	-0.004*
LEGAL$_t$		0.001**	0.001**		0.001**	0.001**		0.001**	[-1.95]
		[2.20]	[2.11]		[2.20]	[2.11]		[2.29]	0.001**
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.268***	-0.917***	-0.457***	-0.129***	-0.917***	-0.457***	-0.294***	-0.631***	-0.162
	[11.70]	[-3.88]	[-3.94]	[-3.14]	[-3.88]	[-3.94]	[-24.80]	[-2.82]	[-1.62]
Observations	8,592	8,592	8,592	8,592	8,592	8,592	9,743	9,743	9,743
Adj. R-squared	0.190	0.070	0.067	0.238	0.070	0.067	0.571	0.070	0.067

Direct effect		-0.015**	-0.008**		-0.015**	-0.008		-0.021***	-0.012***
Indirect		-0.0001	-0.000		0.000	-0.000		-0.001***	-0.000
Total effects		-0.0151**	-0.008**		-0.015**	-0.008**		-.022***	-0.012***

Note: This table reports the regression results of the mediation tests. We use financial reporting quality (|*DAC*|, |*REM*| and *CSCORE*) as the mediators. Robust t-statistics in brackets. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix A.

Columns (1) to (9) of Table 4.6 present the mediation test results. Results reveal an insignificant association between *LnGAP* and |*DAC*| as well as |*REM*|, suggesting that these two reporting quality proxies do not mediate the association between tournament incentives and price crash. In contrast, the result in column (7) shows that tournament incentives increase reporting conservatism (coefficient 0.002 $p<0.01$). Furthermore, we find that the tournament incentives (proxied by *NCSKEW) indirectly* decrease the crash risk through *CSCORE*. That means tournament incentives increase accounting conservatism and, thus, further lower the occurrence of future price crash. Similar to other countries, the demand for conservative reporting is also high in China (Xia & Zhu, 2009). Iwasaki et al. (2018) provide evidence for the positive relationship between accounting conservatism and cash-based compensation contracts in Japan. We, therefore, argue that shareholders are likely to demand more conditional conservatism in financial reporting in China as well, which will constrain future price crash. Overall, the tabulated results indicate that reporting conservatism partially mediates the negative relationship between tournament incentives and price crash in China.

4.6.5 Tournament incentives and price crash: SOEs versus Non-SOEs

Piotroski et al. (2015) suggest that the ownership type affects future price crash. In Chinese stock market, a large proportion of listed companies are SOEs (Chen et al., 2011; Hass et al., 2016; Kato & Long, 2011). The lack of long-term incentive plans, such as stock options, as well as implementation of the "Pay cap policy" in SOEs, has made pay-performance sensitivity weaker for executives in the SOEs (Cao et al., 2011; Firth et al., 2006). Executives in SOEs could acquire extensive political perks along with their political positions, which are not available for their counterparts (Zhang et al., 2018). The higher the political position, the larger the perks they can enjoy. Hence, they can be induced to pursue political promotion rather than internal corporate promotion. Following this logic, previous studies document that the

effect of tournament incentives on firm performance in SOEs is weaker than in their non-SOE counterparts (Chen et al., 2011; Kato & Long, 2011; Lin & Lu, 2009). Consequently, we predict that the constraining effect of tournament incentives on price crash will be pronounced for non-SOEs.

Table 4.7: The effect of state ownership

	(1)	(2)	(3)	(4)	(5)	(6)
	$NCSKEW_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$DUVOL_{t+1}$	$CRASH\_DUM_{t+1}$	$CRASH\_DUM_{t+1}$
	SOE=1	SOE=0	SOE=1	SOE=0	SOE=1	SOE=0
$NCSKEW_t$	0.074***	0.042***			-0.034	0.089
	[5.10]	[2.62]			[-0.40]	[0.93]
$DUVOL_t$			0.074***	0.033**		
			[5.31]	[2.14]		
$LnGAP_t$	-0.009	-0.024**	-0.007	-0.010*	-0.078	-0.194***
	[-0.95]	[-2.08]	[-1.58]	[-1.83]	[-1.38]	[-2.92]
RET_t	1.447***	0.943**	0.718***	0.354*	-0.649	-2.029
	[3.61]	[2.30]	[3.68]	[1.83]	[-0.30]	[-0.81]
$SDRET_t$	10.689***	7.656***	4.910***	2.800**	-10.379	-18.62
	[4.37]	[2.93]	[4.16]	[2.24]	[-0.79]	[-1.23]
$TURN_t$	-0.088*	0.026	-0.032	0.023	-0.288	-0.142
	[-1.71]	[0.45]	[-1.28]	[0.83]	[-0.94]	[-0.42]
$SIZE_t$	0.012	0.028*	0.007	0.012	0.012	-0.034
	[0.97]	[1.72]	[1.24]	[1.50]	[0.17]	[-0.36]
LEV_t	0.024	0.144**	0.008	0.059**	-0.206	0.794**
	[0.43]	[2.50]	[0.30]	[2.06]	[-0.61]	[2.28]
ROA_t	0.308*	0.397**	0.131	0.206**	0.210	3.336***
	[1.75]	[2.16]	[1.50]	[2.27]	[0.19]	[3.04]
MB_t	0.015***	0.009**	0.007***	0.005***	0.051***	0.013
	[4.13]	[2.49]	[3.89]	[2.67]	[2.84]	[0.57]
$\|DAC_t\|$	0.052	0.276**	0.052	0.177***	1.248	0.121
	[0.38]	[2.02]	[0.78]	[2.70]	[1.58]	[0.15]
$\|REM_t\|$	0.095	-0.082	0.038	-0.073*	-0.238	-0.780*
	[1.30]	[-1.10]	[1.05]	[-1.95]	[-0.50]	[-1.78]
$CSCORE_t$	-0.519*	-1.331***	-0.181	-0.550***	-1.547	-1.14
	[-1.68]	[-4.14]	[-1.19]	[-3.44]	[-0.89]	[-0.55]
$BSIZE_t$	-0.034	0.017	-0.025	0.000	0.054	0.165
	[-0.70]	[0.28]	[-1.04]	[0.00]	[0.18]	[0.47]
$BIND_t$	-0.014	0.038	-0.037	-0.003	0.077	0.774
	[-0.07]	[0.17]	[-0.43]	[-0.03]	[0.07]	[0.63]
$DUAL_t$	0.083***	0.000	0.034**	-0.001	-0.040	0.157
	[2.89]	[-0.01]	[2.37]	[-0.11]	[-0.22]	[1.08]
$MOWN_t$	-0.571	0.137	-0.069	0.061	-9.162	0.244
	[-0.62]	[1.51]	[-0.16]	[1.38]	[-0.90]	[0.49]
$IOWN_t$	0.042	0.332***	0.022	0.165***	-0.176	-0.156
	[0.83]	[5.26]	[0.90]	[5.30]	[-0.57]	[-0.42]

$AUDIT_t$	-0.040**	-0.019	-0.020**	-0.004	-0.192*	-0.070
	[-2.11]	[-0.84]	[-2.18]	[-0.38]	[-1.73]	[-0.54]
CAP_t	-0.003	-0.002	-0.001	-0.001	0.000	-0.032
	[-0.50]	[-0.16]	[-0.24]	[-0.16]	[0.01]	[-0.52]
GOV_t	-0.011**	-0.010	-0.004*	-0.005	0.050	0.018
	[-2.09]	[-1.29]	[-1.65]	[-1.27]	[1.54]	[0.35]
$LEGAL_t$	0.001	0.002	0.001	0.001	-0.004	0.004
	[1.60]	[1.53]	[1.48]	[1.46]	[-0.75]	[0.66]
Industry	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Constant	-0.413	-0.811**	-0.217	-0.375**	-1.199	-0.409
	[-1.46]	[-2.19]	[-1.56]	[-2.06]	[-0.71]	[-0.18]
Observations	5,476	4,267	5,476	4,267	5,462	4,164
Adj. R-squared	0.080	0.050	0.080	0.060		
Pseudo R^2					0.042	0.052
Chi2	1.030		0.160		1.850	
Prob>chi2	0.310		0.688		0.173	

Note: This table reports the regression results of the effect of state ownership on the association between tournament incentives and firm-level stock price crash risk. Robust t-statistics in brackets. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix A.

We divide the sample into two subsamples based on whether a firm is an SOE or not. We examine the effect of state ownership based on all three proxies of crash risk. As shown in Table 4.7, the coefficients on *LnGAP* are negative and significant across all three crash risk measures, but for the non-SOE group only. However, the null hypothesis that the coefficients between the SOE and non-SOE groups are not significantly different cannot be rejected, since none of the chi-square values is significant. The insignificant chi-square implies that the tournament incentives do not affect crash risk for these two groups; instead, it is the *innate difference* (i.e. state ownership) between SOEs and non-SOEs that drives the variation in price crash. As discussed previously, political perks and political promotions within SOEs make them inherently different from their non-SOE counterparts (Chen et al., 2017a; Zhang et al., 2018). Overall, our results indicate that the negative association between tournament incentives and crash risk is confined to non-SOEs.

4.7 Conclusion

This study examines the impact of tournament incentives on price crash for a sample of Chinese listed firms from 2007 to 2016. We argue that tournament incentives constrain executives from financial misrepresentation, thereby, reducing future price crash. We find evidence consistent with this hypothesis. The findings remain robust to alternative measurements of crash risk, tournament incentives, and potential endogeneity concerns. We also test the mediation effect of financial reporting quality using three commonly known proxies. We document that conditional conservatism mediates the negative association between tournament incentives and price crash. Furthermore, the empirical findings also suggest that the negative relation between tournament incentives and crash risk is confined to non-SOEs.

Our study contributes to the existing literature in several important aspects. First, our study provides new empirical evidence on the association between tournament incentives and price crash risk. Our findings are in contrast to Jia (2018a), who documents that tournament incentives increase price crash using data from the U.S. Our research responds to Burns et al.'s (2017) call for considering the institutional differences, e.g., cultural, economic, political and legal differences, within which the tournament mechanisms operate. Our study also enriches the executive compensation research by focusing on the executive-team, instead of on CEOs alone, as pay gap research has received far less attention than CEO compensation research, especially in the emerging economies.

CHAPTER FIVE - CONCLUSION

5.1 Conclusion

In this thesis, Essay One provides a systematic review of the existing literature on the determents and consequences of tournament incentives and provides directions for future research. Our review reveals that several firm-level fundamental factors and corporate governance variables affect the level and structure of corporate tournaments. With respect to the consequences of tournament incentives, we report mixed evidence on the effect of tournament incentives on financial reporting quality and audit response. We also find that tournament incentives improve firm performance, boost firm innovation, encourage more risk-taking and increase tax avoidance, as well as increasing executive turnover and the probability of lawsuits. Finally, our review reveals that tournament incentives are related to a number of capital market consequences.

In Essay Two, we examine the role of tournament incentives and offer insight into the extant literature on tournament incentives by investigating how business strategy shapes the tournament incentives. We find that, in China, firms pursuing innovative strategies are more likely to enlarge their tournament size as compared to defender-type firms. The baseline finding remains robust to alternative measurements of tournament incentives, firm-fixed effects, and potential endogeneity concerns. Furthermore, we test the moderating effect of tournament incentives on the association between different business strategies and firm performance. We find some evidence that wider pay disparity in firms with innovative business strategies leads to better performance. In addition, we further explore how state ownership at different levels affects the relationship between business strategy and tournament incentives, and document that this positive and significant relation holds only for local SOEs.

Essay Three examines the effect of tournament incentives on price crash by using a large group of Chinese listed firms during the period from 2007 to 2016. Our main results support the notion that the use of tournament incentives could reduce the occurrence of future price crash by constraining the executives' propensities to misreport financial information. The findings remain robust to alternative measurements of crash risk, tournament incentives, firm-fixed effects, and potential endogeneity concerns. We also explore the mediation effect of financial reporting quality on the association between tournament incentives and price crash by using three commonly known financial reporting quality proxies. The results indicate that conditional conservatism partially mediates the negative relationship between tournament incentives and price crash. We also find that the main results hold only for non-SOEs.

5.2 Research contribution and implications

This thesis contributes to the line of research that integrates corporate governance (tournament incentives) with management (business strategy) and corporate finance (stock price crash risk), and it contributes in the following aspects. First, this thesis enriches the existing literature on tournament incentives. Our research focuses on the executive-team, instead of on the CEOs alone. Unlike CEOs, who receive only an arranged payment based on their absolute performance, senior executives receive additional compensation based on their performance as benchmarked against their peers. Although senior executives play a critical role in firm-level operational decision-making, previous reviews focused mainly on how to design an effective incentive plan for CEOs. Moreover, this research enriches the executive compensation literature by exploring 'tournament incentives' as interplay among senior executives. Although previous studies document that absolute performance-based compensation incentives may aggravate agency problems, whether a tournament-based compensation plan can alleviate such problems is still under debate. Our study, therefore, sheds

new light on debates surrounding optimum compensation plans for firms. Moreover, our research enriches the existing tournament incentive studies by confirming the importance of institutional difference, for instance, a high proportion of family and state ownership, and a cash-dominated compensation structure, in emerging markets. Hence, we call for more international studies to advance our understanding of the effect of country-specific distinctive features on the adoption of tournament incentives. Additionally, there is no empirical research examining the consequences of tournament incentives in a cross-country setting. Therefore, we encourage future research on this issue as this may offer more generalizable findings than the mixed evidence reported in the single-country studies. Overall, the theoretical and empirical evidence documented in this research, therefore, offers some visions for future tournament research, especially in emerging economies.

Second, this thesis extends the scant literature on the *determinants* of tournament incentives by exploring the role of firm-level business strategy. To the best of our knowledge, this is the first study that explores the effect of business strategy on tournament incentives, and our research complements the literature by presenting evidence, in an emerging market such as China, that the business strategy that plays a critical role in shaping firm decisions, has a great impact on the level and structure of corporate tournaments. In addition, this study provides a better understanding of the relationship between tournament incentives and firm performance from the perspective of business strategy, as our research documents that the use of tournament incentives by firms pursuing innovative strategies, generates better performance.

Third, our research also contributes to existing stock price crash literature. It adds new empirical evidence to the research on the consequences of tournament incentives, as the results show that tournament incentives could constrain the likelihood of stock price crash risk. Burns et al. (2017) demonstrate the importance of considering the institutional differences, e.g. cultural, economic, political and legal differences, within which the tournament mechanisms

operate. This study further enriches the tournament incentives and price crash research by documenting the mediating role of financial reporting quality on this association.

The findings from the thesis also offer policy implications for regulators, regarding the appropriate design of managerial compensation for SOEs. The positive relationship between business strategy and tournament incentives for local SOEs documented in this study is a significant finding. This finding implies that the "Pay Cap" policy may not be suitable for local SOEs with innovative business strategies, as such firms need to use a large compensation gap to encourage their executives. In addition, this thesis also provides practical implications for corporate boards and investors by highlighting the beneficial effects of tournament incentives in improving firm performance and mitigating adverse capital market consequences.

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Appendix A: Variable definitions (ESSAY TWO)

LnGAP	Natural logarithm of the pay gap calculated as mean of top 3 executives' compensation minus mean of the rest of the executives' compensation.
LnVPSTD	Natural logarithm of the standard deviation of the pay differentials between the total compensation of top executives and the CEO. *LnVPSTD* is the natural logarithm of the standard deviation of the VPs' compensation, excluding the CEO's compensation, which represents the pay difference between individual VPs.
STRATEGY	Discrete score with values ranging from 6 to 30 where high (low) values indicate prospector (defender) firms, respectively
PROSPECT	A dummy variable coded 1 if the strategy score is between 24 and 30 (both inclusive), and 0 otherwise
DEFEND	A dummy variable coded 1 if the strategy score is between 6 and 12 (both inclusive), and 0 otherwise
ANALYSE	Remaining observations (i.e. observations with a *STRATEGY* score ranging from 13 to 23 (both inclusive)
SIZE	The natural logarithm of the total assets
LEV	Total debts divided by total assets
MTB	The market-to-book ratio of firm i in year t, calculated as market value of equity/book value of equity
SGROW	Sales growth measured as ($Sales_t$-$Sales_{t-1}$/$Sales_{t-1}$).
ROE	Net income divided by shareholders' equity.
DUAL	Firm's CEO duality, which equals one if the CEO also holds the position of the chair of the board, and zero otherwise
AGE	CEO's age
CEOHOLD	The natural logarithm of number of shares own by the CEO within the firm
TENURE	The natural logarithm of the number of months that the CEO has been with the firm
CEOBRD	An indicator variable that equals one if the CEO sits on the corporate board, and zero otherwise
BSIZE	Natural logarithm of the number of directors on the board
BIND	Independence of the board, which is measured as the ratio of the number of independent directors over the total number of directors on the board
MOWN	The percentage of outstanding shares owned by a firm's executive.
LnGDP	Natural logarithm of regional GDP (in 0.1 billion CNY)
SOE	An indicator variable that equals one if the firm is a State-Owned Enterprise (SOE), and zero otherwise.
SOE_Central	An indicator variable that equals one if the firm is a centrally controlled state-owned firm, and zero if the firm is controlled by local government.
$\Delta TOBINQ_{t+1}$	Changes in Tobin's Q [(market value of equity + book value of debts)/book value of total assets] between year t+1 and year t
ΔROA_{t+1}	Changes in ROA (Income before extraordinary items (net income) divided by total assets) between year t+1 and year t

Appendix B: Variable definitions (ESSAY THREE)

Dependent variables	
$NCSKEW_{t+1}$	The negative coefficient of skewness captured by the negative of the third moment of firm-specific weekly returns for each year and separating it by the standard deviation of firm-specific weekly returns raised to the third power. See Eq. (3) for details.
$DUVOL_{t+1}$	The down-to-up volatility. Trading weeks being classified based on down (firm-specific weekly returns below the annual mean) and up weeks (firm-specific weekly returns above the annual mean). We then calculate the standard deviation for both subsamples separately. We use the natural logarithm of the ratio of the standard deviation of the down weeks to the standard deviation of the up weeks. See Eq. (4) for details.
$CRASH\_DUM_{t+1}$	Dummy variable with a value of 1 if a firm experiences one or more firm-specific weekly returns falling 3.09 or more standard deviations below the mean firm-specific weekly return and 0 otherwise.
$CRASH\_NUM_{t+1}$	The number of times in a year a firm experiences a firm-specific weekly return falling 3.09 or more standard deviations below the mean firm-specific weekly return and 0 otherwise.
Independent variables	
$LnGAP_t$	Natural logarithm of the compensation gap calculated as mean of top 3 executives' compensation minus mean of the rest of the executives' compensation (Lin and Lu, 2009).
$LnVPSTD_t$	Natural logarithm of the standard deviation of the pay differentials between the total compensation of top executives and the CEO (Zhang et al., 2018). See footnote 3 for relevant discussion.
Firm-level control variables	
RET_t	The mean of firm-specific weekly returns over the fiscal year t
$SDRET_t$	The standard deviation of firm-specific weekly returns over the fiscal year t
$TURN_t$	Average monthly share turnover during fiscal year t, minus the average monthly share turnover during previous fiscal year t - 1, where monthly share turnover is calculated as monthly trading volume divided by total number of shares outstanding during the month
$SIZE_t$	The natural logarithm of the market value of equity
LEV_t	Total debts divided by total assets at the year-end in book value
ROA_t	Firm profitability, calculated as income before extraordinary items (net income) divided by total assets.
MB_t	The market-to-book ratio of firm i in year t, that is, (market price at the end of fiscal year × number of shares outstanding + net asset value per share × number of non-tradable outstanding shares)/book value of equity
Financial reporting quality proxies	
$\|DAC_t\|$	The absolute value of discretionary accruals, where discretionary accruals are estimated from the modified Jones model (Jones, 1991; Dechow et al., 1995). See Appendix B for a more detailed explanation.
$\|REM_t\|$	The absolute value of total REM calculated as REM= (-1) *abnormal operating cash flow + abnormal production cost + (-1) *abnormal discretionary expenses（Franics et al., 2016).
$CSCORE_t$	The conservatism score estimated following Khan and Watts (2009). See Appendix B for a more detailed explanation.
Firm-level governance controls	
$BSIZE_t$	Natural logarithm of the number of directors on the board
$BIND_t$	Independence of the board measured as the ratio of the number of independent directors over the total number of directors on the board
$DUAL_t$	Firm CEO duality, equal to 1 if the CEO also holds the position of the chair of the board and 0 otherwise
SOE_t	A dummy variable that equals 1 if the firm is a State-Owned Enterprise (SOE) and 0 otherwise.
$MOWN_t$	The percentage of outstanding shares owned by a firm's executive.
$IOWN_t$	The proportion of total outstanding shares that are institutional shareholdings
AUDITt	A dummy variable coded 1 for firms audited by the top ten local audit firms, and 0 otherwise.

ICW_t	The DIB internal control index is constructed by the Shenzhen DIB Enterprise Risk Management Technology Company. The quality of internal control of organizations can be measured by the degree of the realization of the five components of internal control strategy, management, reporting, compliance and asset security.
Province-level control variables	
CAP_t	Access to stock market financing in a region, calculated as the total market capitalization of all listed companies in a region relative to regional GDP.
GOV_t	The extent of government intervention in business in a region, defined as the time that a firm's managers spent with local officials. A higher score means less-severe government intervention in business.
$LEGAL_t$	LEGAL measures the legal enforcement of property rights, defined as the number of patents applied for and approved per engineer in a region; a higher score means stronger legal enforcement. We follow Lee and Wang (2017) to use these variables to control the provincial influences. These three proxies of regional development are from the marketization index created by Fan et al., (2011).
Additional control variables	
$EPERK_t$	Excess perks measured by actual perk consumption minus expected perk consumption. $$Perk/Sales = \alpha_1 + \beta_1 Lntotalcomp + \beta_2 LnAsset + \beta_3 Ln\_Inc + \varepsilon$$ where *Perk/Sales* is the sum of the six expense categories related to perk consumption scaled by revenue, *Lntotalcomp* is the natural log of total compensation for all firm employees, *LnAsset* is the natural log of the book value of total assets, and *Ln_Inc* is the natural log of total income per capita of the region in which the firm is located. The residuals from the above equation represent *EPERK* (Xu et al.2014).
AH_t	The degree of analyst herding. We follow the measurement used in Xu et al. (2017b). This method uses the degree of deviation from the consensus forecast to assess the intensity of herding. It assumes that analysts' forecasts of a firm's earnings will be roughly normally distributed. Thus, the proportion of total forecasts for a given firm within a fiscal year that falls inside a 95 per cent confidence interval is considered a measure of the degree of herding (Xu et al., 2017b). $$AH = \frac{\left[L_{95\%} < \#Forecasts_{i,t} < U_{95\%}\right]}{\left[\#Forecasts_{i,t}\right]}$$ Where $L_{95\%} = \overline{F}_{i,t} - 1.98\sqrt{SD_{i,t}/\#Forecasts_{i,t}}$ is the lower limit of a 95 per cent confidence interval; $U_{95\%} = \overline{F}_{i,t} - 1.98\sqrt{SD_{i,t}/\#Forecasts_{i,t}}$ is the upper limit of a 95 per cent confidence interval. $\overline{F}_{i,t}$ represents the consensus forecast, equal to the mean of analyst annual earnings forecasts for firm i during year t; $SD_{i,t}$ is the standard deviation of the forecasts; and $\#Forecrast_{i,t}$ is the total number of forecasts for firm i during year t.
$QFII_t$	Dummy variable with a value of 1 if a firm has qualified foreign institutional investors (QFIIs) approved by the Chinese government to invest in Chinese markets, and zero otherwise.

Appendix C: Measuring earnings management and conditional conservatism (ESSAY THREE)

B.1. Measurement of firm-specific earnings management (DAC)

We employ the modified Jones model (Dechow et al., 1995) to calculate discretionary accruals, which is a common approach of earnings manipulation. Specifically, we first run the following cross-sectional regressions for each industry (CSRC Industry category) for each fiscal year from 2007 to 2016:

$$\frac{TA_{i,t}}{Asset_{i,t-1}} = \alpha_0 \times \frac{1}{Asset_{i,t-1}} + \beta_1 \times \frac{\Delta Sales_{i,t}}{Asset_{i,t-1}} + \beta_2 \times \frac{PPE_{i,t}}{Asset_{i,t-1}} + \varepsilon_{i,t} \quad \text{(B.1)}$$

The estimated coefficients from Eq. (B.1) are then used to calculate discretionary accruals by following equation (B.2)

$$DisAcc_{i,t} = \frac{TA_{i,t}}{Asset_{i,t-1}} - \left(\hat{\alpha}_0 \frac{TA_{i,t}}{Asset_{i,t-1}} + \hat{\beta}_1 \times \frac{\Delta Sales_{i,t} - \Delta Rec_{i,t}}{Asset_{i,t-1}} + \hat{\beta}_2 \times \frac{PPE_{i,t}}{Asset_{i,t-1}} \right) \quad \text{(B.2)}$$

where $TA_{i,t}$ is total accruals for firm i in year t, calculated as operating profits minus cash flow from operations; $Asset_{i,t-1}$ is the book value of total assets for firm i at the beginning of year t; $\Delta Sales_{i,t}$ is the change in total revenue of firm i in year t; $\Delta Rec_{i,t}$ is the change in accounts receivable for firm i in year t; and $PPE_{i,t}$ is the gross amount of fixed assets for firm i at the end of year t. The variable $DAC_{i,t}$ is the absolute value of discretionary accruals for firm i at year t.

B.2. Real earnings management (REM) measurement

We follow Roychowdhury (2006), proxy by abnormal cash flow from operation, abnormal production cost, and abnormal discretionary expenses.

$$CFO_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1 * \left(1/A_{i,t-1}\right) + \alpha_2 * \left(S_{i,t}/A_{i,t-1}\right) + \alpha_3 * \left(\Delta S_{i,t}/A_{i,t-1}\right) + \varepsilon_{i,t} \quad \text{(B.3)}$$

$$PROD_{i,t}/A_{i,t-1} = \beta_0 + \beta_1 * \left(1/A_{i,t-1}\right) + \beta_2 * \left(S_{i,t}/A_{i,t-1}\right) + \beta_3 * \left(\Delta S_{i,t}/A_{i,t-1}\right) + \varepsilon_{i,t} \quad \text{(B.4)}$$

$$DISEXP_{i,t}/A_{i,t-1} = \gamma_0 + \gamma_1 * \left(1/A_{i,t-1}\right) + \gamma_2 * \left(S_{i,t}/A_{i,t-1}\right) + \varepsilon_{i,t} \quad \text{(B.5)}$$

Where $CFO_{i,t}$ is operating cash flow in period *t*, $A_{i,t-1}$ is total assets in period *t-1*, $S_{i,t}$ is sales in period *t* and $\Delta S_{i,t} = S_{i,t} - S_{i,t-1}$. $PROD_{i,t}$ is the change of inventory in period *t* plus the cost of sales. $DISEXP_{i,t}$ is the discretionary expenses which is equal to operating expenses plus general and administrative expenses. For each firm-year, abnormal cash flow from operations is the actual *CFO* minus the "normal" *CFO* calculated using estimated coefficients from the corresponding industry year model and the firm-years' sales and lagged assets. Following the same logic, we then calculate the abnormal production cost and abnormal discretionary expenses. Considering the firms may use all of the three real transactions to manipulate firm earnings, we build a comprehensive proxy for the real transactions-based earnings management (Cohen *et al*., 2010): $RM_{i,t}$*= (-1) *abnormal operating cash flow + abnormal production cost + (-1) *abnormal discretionary expenses.*

B.3. Measurement of firm-specific conditional conservatism (CSCORE)

We use the firm-year conditional conservatism measure *CSCORE* to measure the degree of accounting conservatism (Khan and Watts, 2009). Companies with a higher *CSCORE* are considered to be more conservative. The *CSCORE* is calculated by using the following equation:

$$CSCORE_{i,t} = \lambda_1 + \lambda_2 SIZE_{i,t} + \lambda_3 MB_{i,t} + \lambda_4 LEV_{i,t} \quad \text{(B.6)}$$

where *SIZE* is the natural log of the book value of total assets; *MB* is the market-to-book ratio; and *LEV* is the ratio of liability-to-assets; and $\lambda 1$, $\lambda 2$, $\lambda 3$, and $\lambda 4$ are the coefficients estimated by the following regression:

$$X_{i,t} = \beta_1 + \beta_2 D_{i,t} + R_{i,t} (\mu_1 + \mu_2 SIZE_{i,t} + \mu_3 MB_{i,t} + \mu_4 LEV_{i,t}) + D_{i,t} \times R_{i,t} (\lambda_1 + \lambda_2 SIZE_{i,t} + \lambda_3 MB_{i,t} + \lambda_4 LEV_{i,t}) + (\delta_1 SIZE_{i,t} + \delta_2 MB_{i,t} + \delta_3 LEV_{i,t} + \delta_4 D_{i,t} * SIZE_{i,t} + \delta_5 D_{i,t} * MB_{i,t} + \delta_6 D_{i,t} * LEV_{i,t}) + \varepsilon_{i,t} \quad \text{(B.7)}$$

where $X_{i,t}$ is calculated as $EPS_{i,t} / P_{i,t-1}$. $EPS_{i,t}$ as the earnings per share of firm *i* at year *t* measured by operating profit divided by the number of shares outstanding. $P_{i,t-1}$ is the stock price at the end of year *t-1;* $R_{i,t}$ is the buy-and-hold return of firm *i* for year *t* from the fifth month in year *t* to the fourth month into year *t + 1*. $D_{i,t}$ is a dummy variable that equals one if $R\ i, t < 0$ and zero otherwise.

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