



# **Managerial Overconfidence: interactions with corporate governance and firm performance**

Ivana Vitanova

## **► To cite this version:**

Ivana Vitanova. Managerial Overconfidence: interactions with corporate governance and firm performance. Humanities and Social Sciences. Université Lyon 2 Lumière, 2014. English. ⟨NNT : ⟩. ⟨tel-03842390⟩

**HAL Id: tel-03842390**

**<https://shs.hal.science/tel-03842390v1>**

Submitted on 7 Nov 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

THÈSE DE DOCTORAT DE  
L'UNIVERSITÉ LUMIÈRE LYON 2

Spécialité

Sciences de Gestion

Présentée par

**Ivana Vitanova Chouquet**

---

MANAGERIAL OVERCONFIDENCE:  
INTERACTIONS WITH CORPORATE GOVERNANCE  
AND FIRM PERFORMANCE

---

sous la direction de: **Laurent Vilanova**

soutenue publiquement le **28 Novembre 2014**

devant le jury composé de :

|                        |                                                                             |                    |
|------------------------|-----------------------------------------------------------------------------|--------------------|
| Marie-Hélène BROIHANNE | Professeur des Universités<br>EM Strasbourg, Université de Strasbourg       | Rapporteur         |
| Yannick MALEVERGNE     | Professeur des Universités<br>Université Saint-Etienne, EM Lyon, ETH Zurich | Suffragant         |
| Sébastien POUGET       | Professeur des Universités<br>IAE Toulouse, Université Toulouse 1 Capitole  | Rapporteur         |
| Antoine RENUCCI        | Professeur des Universités<br>Université de Pau et des Pays de l'Adour      | Suffragant         |
| Laurent VILANOVA       | Professeur des Universités<br>Université Lumière Lyon 2                     | Directeur de thèse |
| Peter WIRTZ            | Professeur des Universités<br>IAE Lyon, Université Lyon 3                   | Suffragant         |



L'université n'entend donner aucune approbation ni improbation  
aux opinions émises dans les thèses; ces opinions doivent être  
considérées comme propres à leurs auteurs.



# Remerciements

Je voudrais remercier, tout d'abord, mon Directeur de Thèse, M. Laurent Vilanova. Je le remercie parce qu'il m'a beaucoup appris, parce qu'il m'a guidé et stimulé intellectuellement et parce qu'il m'a transmis une belle vision de la recherche. Je le remercie d'avoir été exigeant et d'avoir été franc. Je le remercie enfin d'avoir eu confiance en moi.

Je voudrais exprimer également ma reconnaissance envers les autres membres du jury: Mme. Marie-Hélène Broihanne, M. Yannick Malevergne, M. Sébastien Pouget, M. Antoine Renucci et M. Peter Wirtz; pour l'attention qu'ils apporteront à mon travail et leur évaluation critique et constructive. Deux des membres de ce jury, M. Yannick Malevergne et M. Peter Wirtz, ainsi que mon directeur de thèse, M. Laurent Vilanova, ont également été mes professeurs. Je les remercie aussi pour leur rôle dans ma formation universitaire.

Je suis reconnaissante envers les membres du Laboratoire de recherche Coactis, ses deux directeurs consécutifs, M. Franck Tannery et Mme. Martine Séville, ainsi que la gestionnaire, Mme. Faiza Bettaieb, pour m'avoir permis de travailler sur cette thèse dans les meilleures conditions. Merci aussi aux anciens et nouveaux doctorants de Coactis (Joy, Mohammed, Andrey, Laty, Damien et bien d'autres) pour avoir partagé avec moi une partie de ce chemin parfois éprouvant. Plus particulièrement, je voudrais remercier Thierry Serboff. Merci Thierry de m'avoir généreusement accordé une oreille attentive, des conseils avisés et une belle amitié.

Merci à mes amis et ma famille et notamment mon frère Aleksandar et ma "sœur", Biljana. Merci aussi à mes parents, Gordana et Stojan Vitanovi, pour l'exemple, le soutien infaillible et l'amour inconditionnel. Vi blagodaram.

Enfin, je souhaiterais adresser un dernier mot à mon mari, Adrien Chouquet. Adrien, je n'ai malheureusement pas ton talent pour exprimer en peu de mots des émotions très fortes. Saches que je sais ce que tu as fait, ce que tu fais, quotidiennement, avec force, sérénité et tant d'humour. Saches également que je sais pourquoi. Merci.



# Table of contents

|                                                                                                                       |           |
|-----------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Introduction</b>                                                                                                   | <b>1</b>  |
| <b>I La surconfiance managériale: une revue critique de la littérature en finance et management stratégique</b>       | <b>7</b>  |
| 1 Introduction . . . . .                                                                                              | 7         |
| 2 L'explication traditionnelle de la prépondérance des dirigeants surconfiants                                        | 11        |
| 2.1 La surconfiance comme une conséquence du processus de sélection .                                                 | 11        |
| 2.2 La surconfiance comme résultat du biais d'auto-attribution . . . . .                                              | 13        |
| 2.3 La surconfiance comme syndrome associé à la fonction de dirigeant                                                 | 15        |
| 3 Une remise en question de la prépondérance des dirigeants réellement surconfiants . . . . .                         | 17        |
| 3.1 Les avantages sociaux de la surconfiance . . . . .                                                                | 17        |
| 3.2 La surconfiance managériale : mesurée ou observée ? . . . . .                                                     | 19        |
| 4 Les conséquences de la surconfiance managériale . . . . .                                                           | 23        |
| 4.1 Fondements de la vision négative de la surconfiance managériale . .                                               | 23        |
| 4.2 La surconfiance managériale dans l'intérêt des actionnaires . . . . .                                             | 25        |
| 5 Conclusion . . . . .                                                                                                | 28        |
| <b>II Nurturing CEO overconfidence: the dynamics of corporate governance, managerial beliefs and firm performance</b> | <b>35</b> |
| 1 Introduction . . . . .                                                                                              | 35        |
| 2 The endogeneity of CEO overconfidence . . . . .                                                                     | 40        |
| 3 Empirical strategy . . . . .                                                                                        | 43        |

|     |                                                                         |    |
|-----|-------------------------------------------------------------------------|----|
| 3.1 | Sample construction and measures . . . . .                              | 44 |
| 3.2 | Empirical design . . . . .                                              | 48 |
| 4   | Results . . . . .                                                       | 53 |
| 4.1 | CEO overconfidence, Operating performance and Value of the firm .       | 54 |
| 4.2 | CEO Overconfidence and market returns . . . . .                         | 56 |
| 5   | The interaction effect of CEO Overconfidence and Corporate Governance . | 61 |
| 6   | Discussion and conclusion . . . . .                                     | 65 |

### **III CEO overconfidence and corporate tournaments 77**

|     |                                                                     |     |
|-----|---------------------------------------------------------------------|-----|
| 1   | Introduction . . . . .                                              | 77  |
| 2   | Related Literature . . . . .                                        | 81  |
| 3   | Basic framework . . . . .                                           | 83  |
| 4   | Model Resolution . . . . .                                          | 88  |
| 4.1 | A promotion tournament when the CEO is rational . . . . .           | 90  |
| 4.2 | A promotion tournament when the CEO is overconfident . . . . .      | 92  |
| 4.3 | Tournament conditions and prize . . . . .                           | 95  |
| 4.4 | Shareholders welfare . . . . .                                      | 98  |
| 5   | Discussion and empirical implications . . . . .                     | 100 |
| 5.1 | Implications on shareholders' preferences over CEO overconfidence . | 100 |
| 5.2 | Implications on CEO turnover . . . . .                              | 103 |
| 6   | Conclusion . . . . .                                                | 105 |

### **IV Self-efficacy vs. Confidence in Opportunity Outcomes: Which type of entrepreneurial confidence fosters venture emergence? 115**

|     |                                                                                                        |     |
|-----|--------------------------------------------------------------------------------------------------------|-----|
| 1   | Introduction . . . . .                                                                                 | 115 |
| 2   | Theoretical development . . . . .                                                                      | 119 |
| 2.1 | Different types of entrepreneurial confidence: ESE vs. confidence<br>in opportunity outcomes . . . . . | 119 |
| 2.2 | ESE vs. confidence in opportunity outcomes: Effects on venture<br>emergence . . . . .                  | 122 |

|     |                                                                   |            |
|-----|-------------------------------------------------------------------|------------|
| 2.3 | ESE vs. confidence in opportunity outcomes: Effects on motivation | 125        |
| 3   | Methodology . . . . .                                             | 128        |
| 3.1 | Sample . . . . .                                                  | 128        |
| 3.2 | Dependent variables . . . . .                                     | 128        |
| 3.3 | Independent variables . . . . .                                   | 129        |
| 3.4 | Control variables . . . . .                                       | 132        |
| 4   | Results . . . . .                                                 | 133        |
| 5   | Discussion and implications . . . . .                             | 138        |
| 5.1 | Theoretical implications . . . . .                                | 138        |
| 5.2 | Implications for practice . . . . .                               | 140        |
| 5.3 | Limitations and future research directions . . . . .              | 141        |
| 6   | Conclusion . . . . .                                              | 142        |
|     | <b>Conclusion</b>                                                 | <b>153</b> |
|     | <b>List of Tables</b>                                             | <b>159</b> |
|     | <b>List of Figures</b>                                            | <b>161</b> |



# Introduction

Modern social sciences widely acknowledge overconfidence, i.e., the subjective overestimation of ability, knowledge or future performance, as a fundamentally significant factor of human behavior. For example, a basic keyword research over the term “overconfidence” on the Google Scholar website provided 57 000 results (4 579 results came out on the JStore website and 646 on SSRN). Most of the references listed in those results came from the fields of psychology and sociology but articles in behavioral economics were also strongly represented in these rudimentary statistics. A growing number of studies in the fields of economics, management, finance and entrepreneurship also consider the issue of overconfidence.<sup>1</sup>

Over the past two decades, some of the most puzzling behaviors of different categories of economic actors have been attributed to overconfidence. Preeminent examples are: excess entry in venture creation (Camerer and Lovo, 1999); value-destroying mergers and acquisitions (Hayward and Hambrick, 1997; Malmendier and Tate, 2008 ); preferences for debt financing (Hackbarth, 2008) and overinvestment (Malmendier and Tate, 2005).<sup>2</sup>

As evidenced by these examples, overconfidence is most commonly seen as a harmful cognitive bias which leads to both a decrease in social welfare and to an objective reduction of the utility of the biased actors. Notable exceptions to this trend can however

---

<sup>1</sup>As an order of magnitude, in Figure 1 we show the number of articles that relate to overconfidence in 20 prestigious finance and management journals.

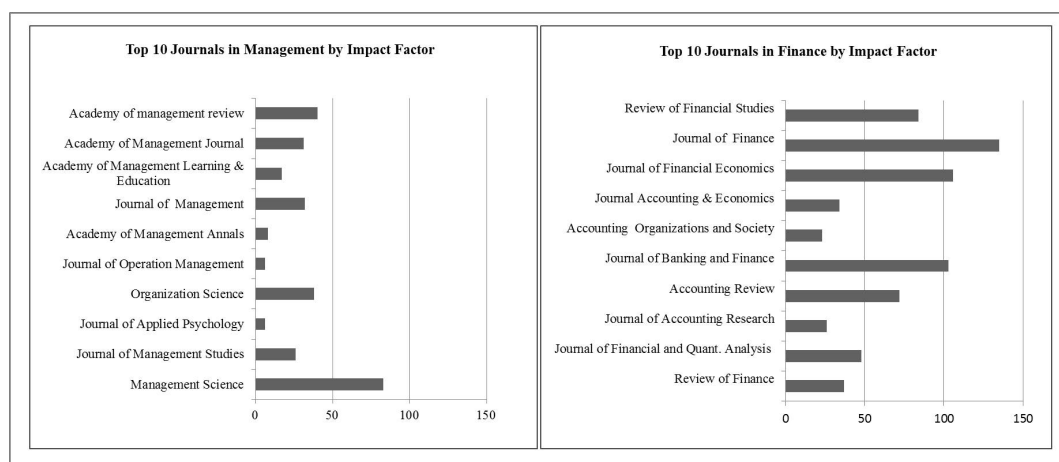
<sup>2</sup>Detailed references of all the publications quoted in this Introduction can be found in the References lists of the subsequent chapters.

be discerned in the field of entrepreneurship. More than elsewhere in the entrepreneurship literature overconfidence is presented as a somewhat “necessary evil” that would be simultaneously a prerequisite for the motivation to create a firm and an impediment to successful venture emergence. In an interesting article on this topic, Hayward et al. (2004) note:

*“A hubris theory of entrepreneurship models how more overconfident actors are more likely to initiate and incorporate ventures and how their ventures are also more likely to fail.”* (Hayward et al., 2004 p. 160).

According to their reasoning, a specific form of self-selection would explain the preponderance of overconfident individuals among entrepreneurs. As a consequence, the effect of overconfidence on the overall probability of venture creation might be ambiguous. Empirical evidence confirms this ambiguity and invites to a more thorough examination of the correlation between entrepreneurial overconfidence and venture emergence (Dimov, 2010; Hmieleski and Baron, 2008).

Figure 1: Number of articles mentioning the word Overconfidence in most prestigious Management and Finance journals



Note: Number of results by keyword research in the entire journal archive up to February, 2014.

The possibility of a similar phenomenon in the case of managers of larger firms has been substantially neglected in the corporate finance and management literature.<sup>3</sup> Stud-

<sup>3</sup>One important exception is the article of Goel and Thakor (2008) that we discuss more profoundly in Chapter I.

ies that address overconfidence among CEOs generally relate the presence of irrational leaders to inefficiencies in corporate governance or imperfections at the labor market for CEOs and support the idea of a negative effect of CEO overconfidence on firm performance.

In light of these observations, this PhD Thesis addresses two questions concerning the relationship between managerial overconfidence and firm performance. First, we question the presumably negative consequences of *CEO overconfidence* by proposing an endogeneity-free empirical study of its effects and by exploring the conditions for positive implications of this bias in large organizations. Second, we propose one possible explanation for the ambiguous consequences of *entrepreneurial confidence*. This explanation is based on the idea that there are different types of entrepreneurial confidence which may have different consequences on the odds of venture emergence.

Chapter 1 consists in a critical review of the existing academic studies on CEO overconfidence. We point out two parallel consensuses in these studies: (i) overconfident CEOs are strongly represented in the CEO population and (ii) CEO overconfidence is individually and socially harmful. Under an efficient market hypothesis, these two consensuses seem inconsistent. We present the various possible explanations of this inconsistency. Namely, we show how selection phenomena similar to the ones operating in entrepreneurship as well as social and contextual factors can explain the preponderance of overconfident CEOs despite the presumably negative consequences of this bias. Then, in a second part, we raise the question of the validity of each of these consensuses. Our reasoning starts from our observation of some technical and conceptual limits in the most famous empirical articles on CEO overconfidence. In particular we show that the existing measures of overconfidence essentially proxy expressions of overconfident beliefs but not necessarily real lack of rationality. A second element of reasoning is related to several recently published theoretical propositions about the potential individual and social benefits of CEO overconfidence such as improved leadership (Bolton et al., 2013), an increase in the interest

alignment between shareholders and executives (Gervais et al. 2011) or reduced moral hazard (de la Rosa, 2010).

Chapters 2 and 3 of this dissertation are in a certain way a response to the critical reasoning presented in our review of the existing literature. In Chapter 2, we perform an empirical analysis of the effects of CEO overconfidence on the firm's operational and market performance which, relatively to previous empirical studies, contains several methodological and conceptual improvements. For example, we empirically control for the possibility of a selection effect in our sample of CEOs. More precisely, we hypothesize that, consistent with the selection and the self-attribution hypotheses of overconfidence, the manifestation of overconfident beliefs by a given CEO is contingent to corporate features such as power allocation, quality of corporate governance and entrenchment opportunities. This generates an endogeneity problem in the statistical analysis of the effects of CEO overconfidence on firm performance that can significantly bias the results. In response to this issue of endogeneity we use a propensity score matching model and create a sample of CEOs who start to manifest overconfidence during our period of observation and a control sample of CEOs who remain rational within the entire observation period although they evolve in a substantially similar corporate context. Then we use these selection-free data and show that firms with overconfident CEOs outperform similar firms with realistic CEOs in terms of operational performance (measured by ROA and ROE), value (measured by Tobin's Q ratio) and stock performance (measured by CARs). At last, we test one specific reason that can explain this result. Namely, we check whether CEO overconfidence can be seen as a substitute to corporate governance, i.e., whether it allows stronger incentives alignment between executives and shareholders. Our results show a statistically significant negative interaction between the intensity of corporate governance in the firm and CEO overconfidence thereby corroborating the interest alignment hypothesis. The main contribution of this chapter is to confirm that controlling for some statistical biases in the data can generate empirical results that contradict the existing stylized facts. This settles all the more the doubts that we express in the review of literature as to the unequivocally

negative vision of CEO overconfidence.

In Chapter 3, we describe a specific corporate context in which CEO overconfidence can be a beneficial attribute for shareholders. We propose a theoretical model of an internal corporate tournament between the members of the top management team (TMT) in a corporation where agency conflicts between shareholders and executives are severe. We start from the classical premise that an increase in the competition between executives generates additional incentives for effort and is purely beneficial to shareholders. In this context, we model a firm in which the decision over the intensity of competition between TMT members is delegated to the CEO because he is the one who determines the gap between his compensation and the compensation of his subordinates (i.e., the tournament prize). In other words, the CEO in our model both actively participates in the contest for the leadership position (he tries to avoid being replaced) and decides on the tournament reward of his opponents. Then, the main question for the shareholders is how to encourage the CEO to implement a competitive incentivizing tournament for TMT members that will jeopardize his own tenure. We show that in such circumstances CEO overconfidence can be valuable for shareholders because overconfident CEOs, who underestimate their personal cost of effort, will be more likely to promote competitive environments by choosing emulating pay gaps and will compete more aggressively to maintain their leadership position. As in Chapter 2, the theoretical predictions of this chapter are closely related to the idea of CEO overconfidence as an aligning vector of the interests of shareholders and top executives.

Chapter 4 is related to the field of entrepreneurship. There are numerous advantages to study a population of nascent entrepreneurs when addressing personality and cognition related issues such as overconfidence. First, individual entrepreneurs are the most crucial (and often the only) decision makers during the venture-creation process so effects related to individual differences can be quite easily disentangled. Second, relative to established companies start-up projects evolve more rapidly and through large leaps. As a

consequence, every day decisions of (potentially overconfident) individuals strongly affect observable performance measures and provide richer and more condensed empirical data. Third, the twofold facet of the overconfidence bias as both a motivating and a misleading factor of human behavior can be more clearly addressed and more thoroughly tested in the field of entrepreneurship. Fourth, unlike “unreachable” CEOs, entrepreneurs have often been the focus of direct ad-hoc surveys. In turn, researchers dispose with direct scale-based measures of different aspects of these actors’ cognition and behavior. This allows more thorough analyses of the kind of cognitive errors that are englobed in the term overconfidence and their distinguishing features. For all these reasons, we analyze the distinctive effects of two different kinds of confidence using data from a longitudinal survey of nascent entrepreneurs called the Panel Study of Entrepreneurial Dynamics I. The theoretical predictions and the empirical results of this analysis compose the fourth chapter of this dissertation.

The main goal of Chapter 4 is to examine whether entrepreneurial self-efficacy (defined as the belief in one’s capabilities to accomplish the tasks relevant to entrepreneurship) and confidence in opportunity outcomes (i.e., nascent entrepreneurs’ confidence in the chances of success for the opportunity they are pursuing) have distinct or similar effects on nascent entrepreneurs’ motivation and on the likelihood of venture emergence. By combining insights from several fields (social cognitive theory, hubris theory and the unrealistic optimism literature) we make two major hypotheses. First we argue that both kinds of confidence can have initial motivational benefits but a major difference emerges when it comes to the persistence of this motivation. Entrepreneurial self-efficacy persistently assures strong motivation and conveys a general positive effect on performance whereas confidence in opportunity outcomes only produces fragile initial motivation that cannot cope with the obstacles and disappointments that are typical to the start-up process. As a consequence, our second major hypothesis predicts that entrepreneurial self-efficacy is a positive predictor of venture emergence, whereas confidence in opportunity outcomes is a negative one. The main contribution of this study is to show that it is the

nature of entrepreneurial confidence – and not only its intensity - that matters for new venture success. Moreover, we show that the mediators of the effects of overconfidence on performance are not exclusively motivational and can be related to various other success factors such as persistence, risk of disappointment or underestimation of the need for financial and cognitive support.



# I. La surconfiance managériale: une revue critique de la littérature en finance et management stratégique

*Celui qui a confiance en lui mènera les autres.*

-Horace

## 1 Introduction

Un des débats les plus animés de la recherche académique en économie et gestion durant les trente dernières années concerne la diversité des comportements humains. Face au paradigme du marché efficient où seuls les agents parfaitement rationnels survivent, un courant plus récent nommé “ économie comportementale ” met en évidence la présence de biais psychologiques durables et d’un manque de rationalité quasi systématique au sein de certaines catégories d’acteurs. En haut de la liste de ces irrationalités se trouve un biais très documenté en psychologie et sciences sociocognitives, le biais de surconfiance. Depuis les années 1990, une abondance de travaux académiques a désigné la surconfiance comme un déterminant du comportement des investisseurs (Wang, 2001), des traders (Gervais and Odean, 2001) des analystes (Hilary and Menzly, 2006), des entrepreneurs (Hayward et al., 2006) et des dirigeants de grandes entreprises (PDGs) (Bessière, 2007; Russo and Schoemaker, 1992). Ces derniers ont été particulièrement concernés par cette qualification. Une riche analyse empirique a déduit à partir du comportement, du discours et des décisions des PDGs une tendance à la surestimation systématique de leurs compétences professionnelles et de leur performance future. Les résultats majeurs de cette analyse se résument en deux grandes idées consensuelles: (i) le biais de surconfiance concerne un

très grand nombre de dirigeants; et (ii) la surconfiance des dirigeants a un impact négatif sur la performance des entreprises.

Le premier consensus, selon lequel la proportion d'individus surconfiants parmi les PDGs est non seulement élevée mais également supérieure à celle qu'on retrouve dans la population générale a été alimenté par des articles phares comme celui de Malmendier and Tate (2005) qui qualifient de surconfiants plus de la moitié des dirigeants de leurs échantillon (58 sur 113 dirigeants ou 97 sur 158 selon la mesure utilisée) ou celui de Graham et al. (2013) qui considèrent comme surconfiants 80% des dirigeants de leur échantillon. En outre, selon certains auteurs l'ensemble des dirigeants des grandes entreprises sont concernés (à des niveaux différents) par le biais de surconfiance (Russo and Schoemaker, 1992). Il s'agirait donc non pas d'un trait managérial marginal ou d'un qualificatif anecdotique décrivant un petit groupe de personnes mais, au contraire, d'un facteur explicatif majeur du comportement de dirigeants des grandes entreprises (Hayward and Hambrick, 1997).

Sous l'hypothèse d'une gouvernance performante et d'un marché du travail des dirigeants efficient, cette prépondérance de dirigeants surconfiants ne pourrait se justifier que si ces derniers se montraient plus performants que les dirigeants non surconfiants. Toutefois, le deuxième consensus que nous avons évoqué prédit un effet négatif de la surconfiance sur la performance des entreprises. A travers son impact sur les décisions d'investissement et de croissance prises par les dirigeants, celle-ci induirait justement une réduction de la richesse des actionnaires. Selon cette littérature, il serait alors dans l'intérêt des actionnaires de recruter des dirigeants parfaitement rationnels ou à défaut d'essayer de "discipliner" (Banerjee et al., 2013) ou de remplacer (Campbell et al., 2011) les dirigeants identifiés comme surconfiants. Comment explique-t-on alors la présence dominante et plus encore la persistance dans le temps de la surconfiance managériale? Si les dirigeants surconfiants sont moins performants que les autres ne devraient-ils pas être "sortis" du marché du travail du fait même de la concurrence ?

L’objectif de cet article est de proposer, à travers une analyse transversale de la littérature sur la surconfiance managériale, un ensemble d’explications à ce paradoxe ainsi qu’une remise en question des deux idées consensuelles qui le constituent. Plus fondamentalement, nous nous efforcerons de montrer comment la littérature existante tente (implicitement ou explicitement) de réconcilier le phénomène de la surconfiance managériale avec les notions classiques des grandes théories économiques.

Une grande partie de la littérature que nous analyserons s’inscrit dans une tradition de l’économie comportementale qui consiste à expliquer la “survie” des acteurs irrationnels à travers une remise en question de la capacité du marché à reconnaître et sanctionner les biais comportementaux. Dans le cas de la surconfiance le raisonnement est alors le suivant : à l’encontre de la volonté des actionnaires, des individus surconfiants atteignent le poste de dirigeant et y restent durablement en raison des imperfections dans le processus de recrutement ou à cause de pratiques de gouvernance inadaptées ou inefficaces. Dans cette logique, plusieurs hypothèses ont été émises sur les facteurs expliquant la prépondérance de dirigeants surconfiants : des facteurs liés aux mécanismes de sélection des dirigeants (Goel and Thakor, 2008), des facteurs liés à l’inclination de ces derniers à s’auto-attribuer les réussites passées (Gervais and Odean, 2001), ou encore des facteurs liés à l’impact de l’environnement externe sur les croyances des individus (Hayward et al., 2004). S’inscrivant au cœur d’un débat plus large quant à la genèse même du biais de surconfiance, ces théories se rapprochent soit d’une vision de la surconfiance comme un trait inné lié à la personnalité d’un individu, soit d’une vision de celle-ci comme un biais comportemental causé par la conjonction de différents facteurs contextuels (Billett and Qian, 2008).<sup>1</sup> A partir de ce postulat, elles décrivent les processus qui soit permettent

---

<sup>1</sup>Le biais de surconfiance se réfère à des erreurs de cognition qui se manifestent de manière systématique au sein d’une population en fonction des conditions environnementales telles que la difficulté de l’exercice ou le statut social des individus observés (Moore et Healey, 2008). La surconfiance n’est donc pas vue comme une spécificité individuelle mais plutôt comme un facteur dans les processus mentaux de traitement de l’information émergeant dans un contexte particulier. Cette définition s’oppose donc à celle de la surconfiance comme un trait de personnalité selon laquelle on considère comme surconfiant un individu qui, de par sa personnalité, aurait tendance à surestimer ses compétences de manière permanente et ce indépendamment du contexte dans lequel il évolue (Hayward and Hambrick, 1997).

l'arrivée des individus surconfiants aux postes de dirigeants, soit favorisent l'émergence du biais de surconfiance auprès des dirigeants déjà en fonction.

Parallèlement, certains auteurs ont essayé de concilier les résultats empiriques sur la surconfiance managériale avec la vision d'un marché efficient, capable d'éliminer les dirigeants "sous-performants". Le point commun de ces travaux est de remettre en question au moins un des deux consensus sur la surconfiance managériale que nous avons décrit. Premièrement, plusieurs études soulignent les implications positives de la surconfiance managériale pour les firmes. Gervais et al. (2011) et Bolton et al. (2013) montrent par exemple la manière dont la surconfiance contribue à un alignement des intérêts des dirigeants et des actionnaires et réduit ainsi les conflits d'agence entre ces acteurs. La surconfiance managériale serait donc souhaitable pour les actionnaires et la présence de dirigeants irrationnels s'expliquerait par les bénéfices que les actionnaires peuvent tirer de cette irrationalité. Bien que récentes et empiriquement peu explorées, ces intuitions permettent de nuancer la vision dominante, quasi-exclusivement focalisée sur la mise en évidence des effets négatifs de la surconfiance managériale.

D'autres auteurs admettent l'effet potentiellement négatif de la surconfiance sur la performance des entreprises mais remettent en question les faits stylisés quant à la proportion d'individus véritablement surconfiants parmi les PDGs (Burks et al., 2013). En effet, certaines ambiguïtés conceptuelles et techniques quant à la mesure de la surconfiance managériale incitent à penser que l'identification des dirigeants surconfiants pourrait être biaisée et conduirait à surestimer l'ampleur de ce phénomène. Conceptuellement, le problème est le suivant : si des dirigeants rationnels perçoivent un intérêt à être perçus comme surconfiants, ils pourraient imiter les dirigeants surconfiants ; dès lors, une simple analyse des croyances exprimées par les dirigeants ne permettrait pas de distinguer les individus biaisés de ceux feignant la surconfiance à des fins stratégiques. Nous montrerons plus loin que l'intérêt à être perçu comme surconfiant se justifie théoriquement et que les mesures les plus courantes de la surconfiance managériale dans la littérature ne

parviennent pas à isoler les dirigeants qui sont véritablement surconfiants sans en avoir conscience des dirigeants qui expriment de la surconfiance de manière stratégique, créant ainsi des classifications imprécises et potentiellement des statistiques biaisées quant à la proportion d’agent irrationnels parmi les PDGs.

Cet article s’articule autour des trois raisonnements que nous venons de présenter. Dans une première section, nous allons présenter les explications de la prépondérance de dirigeants surconfiants comme la conséquence d’un certain nombre d’inefficiences du marché des dirigeants et des mécanismes de gouvernance. Puis, dans les sections 2 et 3 nous inversons l’optique en considérant que le marché est performant et que, d’une part, la prépondérance des dirigeants qualifiés de surconfiants n’est pas forcément une prépondérance de dirigeants irrationnels (Section 2) et d’autre part, si prépondérance des dirigeants surconfiants il y a, elle pourrait s’expliquer par ses effets positifs sur la création de valeur pour les actionnaires (Section 3).

## **2 L’explication traditionnelle de la prépondérance des dirigeants surconfiants**

### **2.1 La surconfiance comme une conséquence du processus de sélection**

Une première vision de la surconfiance est celle d’un trait inné, une caractéristique fondamentale de la personnalité que l’individu porte depuis sa naissance. Indépendante du contexte et des facteurs environnementaux, la surconfiance serait alors une caractéristique distinctive présente chez certains individus et dont les raisons sont à chercher à un niveau psychique ou génétique. Ce postulat implique alors que si des individus surconfiants sont d’avantage représentés dans une population donnée cela ne peut s’expliquer que par des mécanismes de sélection à l’entrée qui définissent la population étudiée. La sur-représentation des individus surconfiants dans la population des PDGs serait alors due

au fait que le métier de dirigeant a pour particularité d'attirer ou de faciliter l'accès à des individus surconfiants. Un des articles fondateurs de ce courant de pensée est le modèle théorique de Goel and Thakor (2008). Ces auteurs se basent sur les caractéristiques du processus de recrutement du dirigeant pour formaliser la notion de sélection à l'entrée. Ils montrent tout d'abord que l'accès au poste de dirigeant au sein d'une entreprise prend la forme d'un tournoi interne parmi les managers intermédiaires (directeurs de divisions ou vice-présidents). Le critère de comparaison dans ce tournoi est la valeur des projets entrepris par les compétiteurs. De ce fait, à l'issue de la compétition, seuls les individus les plus preneurs de risque (dont les projets génèrent les revenus les plus extrêmes) restent en concurrence pour accéder à la tête de l'entreprise. Si, comme ces auteurs le présument, la surconfiance conduit à sous-estimer le risque d'un projet, les candidats surconfiants seraient avantagés dans ce processus et remporteraient plus souvent la compétition que les candidats parfaitement rationnels.

D'autres travaux accordent à la surconfiance un rôle plus indirect en tant que facteur de sélection. Celui-ci passe notamment par les avantages de la surconfiance en termes de communication et de présentation de soi dans un contexte de progression professionnelle. Une littérature très étendue en psychologie sociocognitive étudie l'effet de la surconfiance au sein des groupes et montre que celle-ci : (i) conduit à l'amélioration du statut social de l'individu surconfiant (Anderson et al., 2012); (ii) augmente sa capacité de convaincre (Zarnoth and Snizek, 1997); et (iii) renforce ses chances de devenir leader d'opinion (Radzevick and Moore, 2011; Yaniv and Foster, 1997). On peut ainsi imaginer au moins deux manières dont les avantages sociaux de la surconfiance se reflètent sur la probabilité de gravir les échelons dans une entreprise et d'atteindre le poste de dirigeant. D'une part, un candidat surconfiant est potentiellement plus en mesure de convaincre les actionnaires de sa capacité à diriger l'entreprise. Johnson and Fowler (2011) montrent justement que la surconfiance a un impact fort sur la crédibilité d'une communication alors que Trivers (2010) parle même d'une tromperie de soi (*self-deception*) utile pour l'individu dans la mesure où elle facilite la tromperie des autres (*deception*). D'autre part et plus indirecte-

ment, les individus surconfiants pourraient mieux correspondre à ce que les actionnaires recherchent (consciemment ou pas) dans la personnalité d'un dirigeant : le charisme (Khurana, 2002), la capacité à entraîner les autres (Bernardo and Welch, 2001), l'aptitude à coordonner et rassembler (Bolton et al., 2013), l'aptitude à donner l'exemple et gérer les problèmes de passagers clandestins (Gervais and Goldstein, 2007). Les actionnaires valoriseraient alors l'influence sociale permise par la surconfiance et choisiraient délibérément de mettre à la tête de l'entreprise un individu surconfiant en négligeant les impacts collatéraux, supposément négatifs, que ce choix pourrait avoir sur leur richesse personnelle.

L'ensemble des arguments présentés ci-dessus composent ce qu'il convient d'appeler l'hypothèse de sélection de la surconfiance managériale. Selon cette hypothèse ce sont les spécificités du recrutement des dirigeants ou plus largement le processus d'appariement entre le profil psychologique de l'individu et les attentes d'une assemblée d'actionnaires qui expliquent la prépondérance de managers surconfiants.<sup>2</sup> Plus facile à tester du point de vue économétrique (car reposant sur une classification statique des individus) et soutenue par des doctrines en psychologie sociocognitive sur l'aspect inné de la surconfiance (Cesarini et al., 2009), cette hypothèse de sélection est la plus largement répandue dans les travaux empiriques de finance et de management stratégique. Cependant, des articles plus récents commencent à intégrer des éléments contextuels dans la manifestation de la surconfiance managériale et remettent en cause son aspect permanent.

## 2.2 La surconfiance comme résultat du biais d'auto-attribution

La deuxième justification de la prépondérance de dirigeants surconfiants dans les études comportementales repose sur la notion de "biais d'auto-attribution" (*self-attribution bias*). Largement exploré dans les études de psychologie et sociologie cognitive, ce concept est

---

<sup>2</sup>Une facette de cette hypothèse de sélection est le phénomène d'auto-sélection selon lequel certains types d'individus sont attirés par certains types de fonctions et que du coup un couplage naturel pourrait s'établir entre les individus surconfiants et les postes de dirigeant. Même si cette idée est peu explorée dans la littérature de finance et management stratégique nous pensons qu'elle pourrait expliquer notamment la sur-représentation des managers narcissiques à la tête des grandes entreprises. En recherchant une situation de visibilité publique où ils peuvent bénéficier de l'attention générale, les individus narcissiques s'orienteraient plus fréquemment vers des postes de dirigeant que les individus rationnels.

défini comme la prédisposition des individus à surestimer leur contribution aux succès passés et à sous-estimer leur “faute” dans des expériences d’échec, en accusant la mauvaise chance ou l’environnement. Dans un article intitulé *“Are overconfident CEOs born or made? Evidence of self-attribution bias from frequent acquirers.”*, Billett and Qian (2008) écrivent que la surconfiance des dirigeants est la conséquence d’un processus d’auto-attribution où ces derniers voient les réussites passées comme un indicateur (trop précis) de leurs compétences managériales. Ce papier montre en effet que les dirigeants qui ont déjà orchestré des procédures de fusions-acquisitions (F&A) ont une propension plus forte à réitérer ce type de projets bien que la performance et la valeur créée s’affaiblissent au fur et à mesure de la répétition de ces opérations. Gervais and Odean (2001) formalisent la notion d’auto-attribution (qu’ils définissent comme un apprentissage biaisé de soi-même) en introduisant un paramètre de surpondération des bonnes décisions passées par rapport aux mauvaises dans la révision bayésienne des croyances d’un individu. Dans le même sens, Hayward and Hambrick (1997) montrent que l’“hubris” du dirigeant est positivement corrélé à la performance financière passée de l’entreprise, suggérant ainsi que la performance passée a un impact exagéré sur l’avis que le dirigeant se fait de ses compétences et de sa capacité à être performant à l’avenir.

Un aspect important de cette théorie concerne la définition de la surconfiance managériale comme une caractéristique acquise et variable dans le temps. Contrairement à l’hypothèse de sélection, on considère ici une croyance qui s’est développée à la suite d’un certain nombre d’expériences positives et qui peut évoluer au cours du temps. De surcroît, selon cette théorie, la survenue du biais de surconfiance est conditionnelle à l’existence d’un autre biais cognitif lié à l’apprentissage des individus et leur capacité à intégrer correctement l’information contenue dans les résultats passés. En d’autres termes, le biais de surconfiance est vu comme le résultat de la combinaison de deux facteurs : la tendance exagérée à l’auto-attribution et un ensemble de réussites passées qui permettent à cette tendance de se transformer en biais de surconfiance.

Il faut également noter que ce courant de recherche n'explique plus la prépondérance des dirigeants surconfiants par une spécificité du processus de recrutement mais plutôt par l'incapacité des actionnaires à empêcher ou à maîtriser le développement de ce biais chez ceux qu'ils ont désigné comme dirigeants. Il s'agirait alors plus d'un problème de gouvernance où les mécanismes de contrôle mis en place par les actionnaires ne parviennent pas à empêcher la "mutation" du biais d'auto-attribution en biais de surconfiance. Selon ce raisonnement, les actionnaires sont passifs et subissent les conséquences de la surconfiance managériale sans avoir contribué à son développement. Une troisième hypothèse quant à l'origine de la surconfiance managériale va un pas plus loin et considère que les actionnaires et les autres parties prenantes qui sont en interaction avec le dirigeant participent activement au processus qui mène à l'émergence de la surconfiance managériale en façonnant le métier de dirigeant et les circonstances dans lequel il s'exerce.

## **2.3 La surconfiance comme syndrome associé à la fonction de dirigeant**

La troisième hypothèse sur la prépondérance des dirigeants surconfiants s'appuie non pas sur les individus qui occupent le poste de dirigeant mais sur les spécificités mêmes de ce poste dans le contexte socio-organisationnel contemporain. Le fondement de cette hypothèse est de considérer qu'en raison de la rémunération, de l'allocation du pouvoir et du traitement médiatique des "grands" dirigeants, le biais de surconfiance est devenu en quelque sorte un "effet secondaire" du métier de dirigeant. Ainsi, dans un article s'intéressant aux conséquences de la célébrité médiatique des dirigeants des grandes entreprises américaines, Hayward et al. (2004) suggèrent que les dirigeants "vedettes", qui bénéficient d'un traitement médiatique élogieux, finissent par "croire à leur propre presse" et développent une vision trop positive de leurs aptitudes managériales. En internalisant leur notoriété, ces dirigeants deviennent surconfiants et surestiment autant leur rôle dans les succès passés que leur degré de maîtrise des enjeux futurs. Par ailleurs, Paredes (2005) propose une explication de la surconfiance managériale comme le produit d'un système de gouvernance des entreprises inefficace. Il désigne deux volets à travers lesquels le système

de gouvernance et ses acteurs nourrissent le sentiment de confiance en soi du dirigeant en le poussant vers un niveau exagéré: (i) les rémunérations excessives des dirigeants des grandes entreprises et surtout la supériorité de ces rémunérations relativement à celles des autres membres de l'organisation et (ii) l'indulgence et le manque de contestation de la part des actionnaires qui approuvent les décisions stratégiques du dirigeant sans jamais questionner son jugement ou ses capacités. Ce deuxième volet est fortement lié à l'idée du pouvoir comme un facteur important dans le développement de la surconfiance (Anderson and Galinsky, 2006; Keltner et al., 2003). Dans cette optique, la tendance à concentrer le contrôle sur l'ensemble des décisions organisationnelles et stratégiques dans les mains d'un individu sans lui imposer des contraintes d'argumentation peut renforcer son sentiment de supériorité et faciliter l'usage d'heuristiques dans la formation de ses croyances.

Dans une étude sur les présidents américains et les premiers ministres britanniques des 100 dernières années, Owen and Davidson (2009) introduisent le concept de "syndrome d'hubris". Il est défini comme un ensemble de caractéristiques provoquées par un déclencheur spécifique, le pouvoir, et qui se développent comme une réponse aux enjeux et aux défis de la position de leader. Bollaert and Petit (2010) établissent un parallèle entre ces dirigeants politiques et les dirigeants des grandes entreprises et montrent que, comme pour les leaders politiques, les spécificités du poste de PDG telles que la forte responsabilité, la pression des médias et de la communauté financière, la gratification exagérée et les pouvoirs excessifs, pourraient engendrer une déformation de la vision que les dirigeants se font d'eux-mêmes, les poussant à devenir surconfiants.

Comme dans le cadre de l'hypothèse d'auto-attribution, la surconfiance est vue ici comme un biais acquis qui varie au cours du temps et qui est conditionnel à un contexte particulier. Cette hypothèse, qu'on peut nommer l'hypothèse du syndrome d'hubris, estime que la surconfiance peut émerger auprès de tout individu indépendamment de sa personnalité et qu'elle est la conséquence directe de différents facteurs environnementaux.

La surconfiance serait alors liée au poste de dirigeant et non pas à l'individu qui l'occupe. La prépondérance de dirigeants surconfiants est donc, en toute logique, la conséquence d'un système socio-organisationnel sous-optimal qui pervertit la fonction managériale.

Bien que différentes, ces trois hypothèses quant aux justifications de la surconfiance managériale (résumées dans le Tableau 1) ont un élément commun : elles considèrent celle-ci comme strictement non-intentionnelle, l'individu surconfiant n'étant pas conscient de son biais et pensant être rationnel. Dans l'ensemble des travaux que nous avons cité la possibilité que des individus parfaitement rationnels pourraient exprimer des croyances biaisées de manière délibérée ou stratégique est écartée à priori. Dans ce qui suit, nous allons présenter quelques arguments qui remettent en cause l'idée de la surconfiance managériale comme un pur phénomène de manque de rationalité. Nous allons montrer justement que la surconfiance souvent observée chez les PDGs pourrait parfois être le fruit d'une stratégie de communication délibérée et rationnelle.

### **3 Une remise en question de la prépondérance des dirigeants réellement surconfiants**

#### **3.1 Les avantages sociaux de la surconfiance**

Un postulat implicite de la littérature est que les individus rationnels ont intérêt à ne pas imiter les individus surconfiants du fait de l'impact négatif de la surconfiance sur la performance individuelle et collective. Ce postulat est cependant loin d'être inattaquable. Sous certaines conditions, il est en effet possible que la surconfiance soit gage d'amélioration de la performance individuelle. Dans un tel contexte des dirigeants rationnels pourraient être incités à afficher une surconfiance apparente.

Au centre de ce raisonnement est l'idée que la surconfiance peut avoir une fonction sociale consistant à renforcer le statut social ou l'influence d'un individu dans ses inter-

actions avec les autres. Cet aspect fonctionnel est d’ailleurs fortement lié à l’hypothèse de sélection que nous avons présentée précédemment. Si la surconfiance est un facteur permettant d’augmenter la probabilité d’accéder à la fonction de dirigeant (Goel and Thakor, 2008) ou à atteindre une position élevée dans la hiérarchie (Anderson et al., 2012), alors elle peut être vue comme un trait désirable. Dans ce cas, la seule manière de décourager des individus parfaitement rationnels à “masquer” leurs véritables croyances serait de mettre en place un mécanisme sanctionnant les comportements surconfiants quand ceux-ci sont révélés ex post. Une première sanction de ce type pourrait être la perte de crédibilité ou la dégradation du statut social. Plusieurs études expérimentales ont comparé les bénéfices sociaux procurés par la surconfiance à ses coûts réputationnels subséquents (Anderson et al., 2012; Tenney et al., 2008). Les résultats de ces études peuvent être résumés de la manière suivante : *“Overconfidence led to social benefits when undetected and had no associated social costs once she was discovered.(...) Accordingly, the current findings bolster the notion that overconfidence is socially rewarding for the individual and help explain the frequency of this bias.”* Tenney et al. (2008, p.35)<sup>3</sup>. Anticipant l’absence (ou la faiblesse) des sanctions ex post, certains individus rationnels pourraient donc essayer de bénéficier des avantages sociaux qu’un comportement semblable à celui des acteurs surconfiants pourrait leur apporter.<sup>4</sup> Dans ce sens, Campbell et al. (2011) montrent par exemple que les dirigeants ayant des niveaux de surconfiance modérés sont remplacés beaucoup moins souvent que les dirigeants rationnels ou les dirigeants dont la surconfiance est extrême.

Il est alors délicat d’affirmer avec certitude qu’un dirigeant qui paraît surconfiant

---

<sup>3</sup>“La surconfiance apporte des avantages sociaux quand elle n’est pas détectée et n’engendre pas d’inconvénients d’un point de vue social une fois détectée(..) Par conséquent, nos résultats soutiennent l’idée que la surconfiance est socialement gratifiante pour l’individu et contribuent à expliquer le fréquence de ce biais”.

<sup>4</sup>Sous l’hypothèse d’un impact négatif de la surconfiance managériale sur la performance collective, l’absence de sanction à l’égard des comportements surconfiants pourrait attester du manque de rationalité des autres parties prenantes (salariés, actionnaires, etc) lié notamment à des mécanismes de réduction de la dissonance cognitive (ces acteurs ne voudraient pas remettre en question leurs décisions initiales consistant à “faire confiance” aux dirigeants). Curieusement, la situation serait alors inversée, les agents en apparence surconfiants pouvant être en réalité ceux qui sont rationnels et qui profitent du manque de rationalité de leurs interlocuteurs.

le soit vraiment. Compte tenu de cela, estimer le nombre de dirigeants surconfiants (véritablement) irrationnels solliciterait l'utilisation de mesures aptes à isoler la surconfiance exprimée de la surconfiance ressentie. Dans la prochaine section, nous décrivons brièvement les mesures de la surconfiance managériale utilisées dans les articles de finance et management stratégique et nous montrons que, malheureusement, aucune d'entre elles ne permet cette distinction.

### 3.2 La surconfiance managériale : mesurée ou observée ?

La majorité des mesures de la surconfiance proposées dans la littérature managériale sont des mesures indirectes, s'appuyant sur une observation non-participative du comportement du dirigeant en non sur un questionnaire direct de celui-ci.<sup>5</sup> On peut distinguer deux types de raisonnement dans la construction de ces mesures indirectes. Le premier consiste à observer la manière dont le dirigeant d'une entreprise gère son portefeuille personnel de titres boursiers. Le deuxième se base sur la couverture médiatique du dirigeant et la manière dont il se présente devant le grand public.

L'article fondateur du premier type de raisonnement est celui de Malmendier and Tate (2005). Ces derniers partent du postulat que les dirigeants des grandes entreprises sont généralement sous-diversifiés parce qu'une grande partie de leurs revenus extra-salariaux dépend de la performance boursière de l'entreprise qu'ils dirigent (par le biais des stock-options et autres formes de rémunération indexées sur le cours du titre de leur entreprise). En tant qu'agents averses au risque et conscients de cette sous-diversification, les dirigeants devraient donc vendre leurs titres ou exercer leurs stock-options le plus rapidement possible. En partant de cette logique, Malmendier and Tate (2005) proposent trois mesures dichotomiques de la surconfiance managériale: *Holder67* qui qualifie de surconfiants les managers qui n'exercent pas leurs stock-options même lorsque celles-ci dépassent le seuil

---

<sup>5</sup>Quelques mesures directes, provenant d'enquêtes ad-hoc et inspirées d'échelles proposées dans des littératures connexes ont également été conçues. Parmi elles, on retrouve la Life Orientation Test-Revised (LOT-R) utilisé par Graham et al. (2013), ou encore la mesure du "mauvais étalonnage" (micallibration) utilisé par Ben-David et al.(2013) qui demandent aux directeurs financiers des plus grandes entreprises américaines de faire des prévisions sur une et dix années concernant la valeur de l'indice SP 500 et de renseigner ensuite leur intervalle de confiance concernant cette prévision.

de rentabilité défini comme benchmark par Hall and Murphy (2000); *Longholder*, qui désigne comme surconfiants les dirigeants qui conservent leurs stock-options jusqu'à la dernière année d'échéance, et *NetBuyer* selon laquelle sont surconfiants les dirigeants qui sont majoritairement acheteurs nets des actions de leur propre entreprise sur les cinq dernières années. En l'espace de quelques années, ces mesures, et notamment la mesure *Holder67*, sont devenues la référence dans la littérature financière et sont largement acceptées par la communauté académique<sup>6</sup> (Banerjee et al., 2013; Campbell et al., 2011; Galasso and Simcoe, 2011; Hirshleifer et al., 2012).

La deuxième manière de mesurer la surconfiance managériale consiste à analyser la description du dirigeant dans la presse grand public, ou encore l'image que celui-ci met en avant lors de ses communications médiatiques. Ce type de mesure a d'abord été introduit dans les travaux sur le narcissisme (Chatterjee and Hambrick, 2007; Hayward and Hambrick, 1997) puis repris dans des articles sur la surconfiance managériale (Malmendier and Tate, 2008). Fondamentalement la mesure de Malmendier and Tate (2008) consiste à compter pour chaque dirigeant le nombre d'articles dans la presse grand public qui le décrivent comme (a) confiant et (b) optimiste ou au contraire comme (c) prudent, conservateur, pragmatique, pas confiant ou pas optimiste. Un dirigeant est qualifié de surconfiant si le nombre d'articles de type (a) et (b) sur une période donnée est supérieur au nombre d'articles de type (c) sur cette même période. Cette méthodologie a également été reprise par la suite dans les travaux de Brown and Sarma (2007); Hirshleifer et al. (2012) et Hribar and Yang (2010).

Le test principal auquel nous souhaitons soumettre ces mesures concerne leur capacité à prédire si le comportement des dirigeants qu'elles décrivent reflète réellement un manque

---

<sup>6</sup>Il est important de noter que la reproduction de ces mesures est parfois très approximative. Par exemple, Banerjee et al. (2013) créent une mesure inspirée du proxy *Holder67* en calculant simplement le ratio entre la valeur des stock-options exerçables mais non encore exercées et la valeur du cours de l'action de l'entreprise. Ils considèrent ensuite que plus ce ratio est élevé (plus les stock-options conservées sont dans-la-monnaie) plus le dirigeant en question est confiant, avec à l'extrême du continuum, les dirigeants surconfiants. Cette classification est bruitée par les caractéristiques des stock-options détenues et surtout elle néglige un élément essentiel de la mesure *Holder67* qui est de comparer les décisions des dirigeants surconfiants à des décisions de référence jugées rationnelles selon le benchmark de Hall et Murphy (2000).

de rationalité dont l'individu n'est pas conscient. En proposant leur mesure *Holder*<sup>67</sup>, Malmendier and Tate (2005) soulèvent cette question et proposent la réponse suivante: si conserver ses stocks options au-delà du seuil prédit par Hall and Murphy (2000) génère des pertes financières en moyenne, les dirigeants rationnels anticiperaient ces pertes et verraient ce moyen de se signaler comme une stratégie coûteuse voire sous-optimale. Ils montrent alors que les dirigeants qu'ils qualifient de surconfiants dans leur échantillon sont généralement perdants sur l'exercice de leurs stocks options contrairement aux dirigeants qui sont qualifiés de rationnels. Bien que cette discussion soit un effort intéressant pour aborder la question de la "non-imitation" elle ne permet pas d'évacuer la totalité du problème. Dans la mesure où nous ne disposons pas d'informations quant aux bénéfices extra-financiers provenant du fait d'être considérés comme surconfiants nous ne pouvons pas vraiment retracer le raisonnement "coût/bénéfices" de ces dirigeants et écarter ainsi l'hypothèse que la stratégie d'exercice tardif de stock-options soit le fruit d'une stratégie de communication rationnelle.

De la même manière, les mesures indirectes basées sur la couverture médiatique ne reflètent que l'expression des croyances des dirigeants. Ce type de mesures est d'ailleurs d'avantage soumis au risque que le dirigeant en question souhaite afficher une image faussée de soi-même et maîtriser sa communication. Une littérature grandissante en management stratégique aborde justement la question du management des impressions (impression management) qui concerne l'affichage délibéré voire exagéré de certains traits de personnalité dans le but d'envoyer des signaux particuliers et de manipuler l'impression de ses interlocuteurs.<sup>7</sup> En s'inspirant de cette littérature, nous allons faire ici l'hypothèse

---

<sup>7</sup>Selon certaines théories, ce processus, aussi appelé présentation de soi (*self-presentation*), se réfère aux pratiques de communication à travers lesquelles les individus cherchent à contrôler également les impressions qu'ils se font d'eux-mêmes. L'objectif serait alors de maintenir ou de créer une certaine image de soi afin d'alimenter l'estime de soi ou de rester conforme à une identité désirée (voir Leary et Kowalski (1990) pour une revue). L'effet que la tromperie de soi peut avoir sur l'amour propre ainsi que les bénéfices motivationnels et sociaux de celle-ci ont notamment été étudiés par Taylor (1989) dans ces travaux sur les Illusions Positives. Cette idée a par la suite été redéployée dans des nombreux domaines mettant en évidence le rôle motivationnel ou stimulant que la confiance en soi et l'optimisme peuvent avoir sur le bien-être des individus. Bien qu'intéressant, cet aspect auto-persuasif de la communication des croyances biaisées n'est pas l'objet central de ce papier et nous nous restreindrons ici aux effets sociaux (externes à l'individu) de la communication surconfiante.

que la manifestation de surconfiance parmi les dirigeants peut correspondre à un effort d’affichage social (Burks et al., 2013). Cela peut être dû au fait que la vision des bons leaders dans l’imaginaire collectif est de plus en plus prédéfinie, modelée par les médias, par des références historiques, ou des exemples saillants de dirigeants vedettes. Une riche littérature académique et grand public sur le leadership efficace, la médiatisation de cette fonction et la présence croissante des grands dirigeants sur les stands littéraires et les réseaux sociaux ne font que renforcer ce phénomène. La communication et la manière d’être de ces acteurs est d’ailleurs de plus en plus orchestrée par des agences de communication ou des “executive coaches” (de Vries, 2011) qui définissent le “bon” profil de dirigeant en s’appuyant sur des personnages emblématiques de l’histoire tels qu’Alexandre le Grand, César, Napoléon ou des dirigeants très médiatisés comme Mark Zuckerberg, Steve Jobs or Howard Schultz. Il en résulte une image collective du dirigeant comme une personne visionnaire, sûre de soi, inébranlable et tenace. Une volonté parmi les dirigeants des grandes entreprises de correspondre à ce profil spécifique et un effort de communication dans ce sens pourrait alors fausser notre perception de leurs véritables croyances.

Compte tenu de ces arguments, nous proposons ici une nouvelle hypothèse pour expliquer la forte proportion de dirigeants (qualifiés de) surconfiants dans les travaux académiques de finance et de management stratégique. Selon cette hypothèse la surconfiance managériale observée est au moins partiellement due à un phénomène d’affichage intentionnel qu’on ne peut pas isoler empiriquement de l’expression honnête des croyances d’un individu. Le consensus quant à la prépondérance de dirigeants surconfiants doit alors être complété par l’idée qu’une partie de ces dirigeants ne présente pas forcément de manque de rationalité au sens strict et ce malgré un discours et un comportement manifestement biaisé. Nous ajoutons cette hypothèse à la liste (présentée dans le tableau 1) des raisons expliquant le consensus sur la prépondérance des dirigeants surconfiants.

Si les arguments présentés ci-dessus permettent d’expliquer la présence de dirigeants surconfiants dans un cadre où la surconfiance est jugée comme négative pour les ac-

tionnaires, une explication alternative de leur présence consisterait à remettre en cause justement la négativité de ce biais. Dans la section qui suit nous allons montrer que l'impact de la surconfiance managériale sur la performance financière et opérationnelle d'une entreprise est pour le moins ambigu.

## **4 Les conséquences de la surconfiance managériale**

### **4.1 Fondements de la vision négative de la surconfiance managériale**

Les implications les plus étudiées de la surconfiance managériale concernent des décisions stratégiques et financières telles que les investissements, les dépenses en recherche et développement, les procédures de fusion et acquisition ou les choix de financement. La plupart des études concluent à l'effet négatif de la surconfiance managériale sur la performance de la firme. C'est notamment le cas dans le cadre des opérations de fusions-acquisitions où les échecs sont souvent reliés à un dirigeant acquéreur trop confiant. Un des premiers papiers à faire ce lien est celui de Roll en 1986. Hayward et Hambrick (1997) corroborent empiriquement ce résultat en montrant que l'hubris du dirigeant influence positivement la prime que l'entreprise acquéreuse est prête à payer et est négativement corrélée avec la performance a posteriori de l'acquisition. Plus récemment, Brown et Sarma (2007) et Malmendier et Tate (2008) proposent des nouveaux résultats empiriques allant dans le même sens.

Parallèlement, certains auteurs visent à démontrer que les dirigeants surconfiants prennent de mauvaises décisions financières. Malmendier and Tate (2005) montrent par exemple qu'il y a une relation positive entre la surconfiance managériale et l'ampleur des (sur)investissements dans une entreprise alors que Hribar and Yang (2010) relient la surconfiance managériale à la fréquence et l'optimisme des prévisions comptables, à leur degré d'inexactitude et à la propension des firmes à adopter des pratiques comptables agressives.

Dans le même esprit, une branche importante de la littérature étudie la manière dont

Table 1: Hypothèses quant à la prépondérance de dirigeants surconfiants

| Nom de l'hypothèse                           | Prédiction                                                                                                                                                                                                              | Références majeures                                                   | Définition                 |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------|
| Hypothèse de sélection                       | Les caractéristiques du processus de recrutement et les critères de sélection pour le poste de dirigeant expliquent la prépondérance d'individus surconfiants parmi les dirigeants.                                     | Goel et Thakor (2008)<br>Zarnoth et Sniezeck, (1997)                  | Trait inné                 |
| Hypothèse de l'auto-attribution              | L'auto-attribution des réussites organisationnelles passées explique la prépondérance d'individus surconfiants parmi les dirigeants.                                                                                    | Billett et Qian (2008)<br>Hayward et Hambrick (1997)                  | Biais acquis               |
| Hypothèse du syndrome d'hubris               | La gratification exagérée du dirigeant de la part des médias et des actionnaires ainsi que l'allocation du pouvoir au sein de l'organisation expliquent la prépondérance d'individus surconfiants parmi les dirigeants. | Bolleart et Petit (2010)<br>Owen et Davidson (2009)<br>Paredes (2005) | Biais acquis               |
| Hypothèse de présentation de soi             | L'expression stratégique de surconfiance en tant qu'outil d'affichage social explique la prépondérance d'individus (qualifiés de) surconfiants parmi les dirigeants.                                                    | Burks et al. (2010)                                                   | Expression stratégique     |
| Hypothèse de l'optimalité de la surconfiance | Les bénéfices de la surconfiance managériale pour les actionnaires de l'entreprise expliquent la prépondérance d'individus surconfiants parmi les dirigeants.                                                           | Gervais et al. (2011)<br>Goel et Thakor (2008)                        | Biais acquis<br>Trait inné |

les actionnaires pourraient “se protéger” ou réduire les effets néfastes de la surconfiance managériale par des mécanismes de gouvernance ou des procédures de remplacement. Banerjee et al. (2013) vérifient ainsi l’impact “disciplinant” des mesures de renforcement de la gouvernance des entreprises (telles que la législation Sarbaney-Oxley Act, votée aux Etats Unis en 2002) sur la tendance des dirigeants surconfiants à surinvestir et à s’exposer au risque ainsi que sur leur réticence à distribuer des dividendes. Paredes (2005) propose par ailleurs quelques autres mécanismes à travers lesquels les actionnaires et le législateur peuvent réduire ou maîtriser la surconfiance managériale. Selon eux, le conseil d’administration pourrait par exemple “dé-biaiser” le dirigeant en le rendant conscient de sa surconfiance et en lui rappelant régulièrement ses échecs passés. Ils proposent aussi la désignation formelle d’un “*Chief Naysayer*”, un professionnel dont le rôle est d’identifier et de présenter toutes les contestations possibles des propositions du dirigeant. Ils prônent enfin le renforcement des obligations légales des dirigeants à travers la mise en place de sanctions juridiques de la “mauvaise gestion de bonne foi”, c’est-à-dire des erreurs managériales dont on ne peut pas prouver l’intentionnalité.<sup>8</sup>

Plus récemment, cette vision unilatéralement négative de la surconfiance a été remise en question. Une littérature essentiellement théorique s’est focalisée sur le potentiel positif du biais de surconfiance, présenté comme un mécanisme d’alignement des intérêts des actionnaires et des dirigeants ou comme un atout dans la fonction de leadership.

## 4.2 La surconfiance managériale dans l’intérêt des actionnaires

La surconfiance managériale pourrait avoir trois types d’effets positifs pour les actionnaires des grandes entreprises. Elle pourrait en premier lieu permettre d’aligner les intérêts des dirigeants et des actionnaires. Goel and Thakor (2008) montrent par exemple qu’en sous-estimant le risque des projets qu’ils entreprennent les dirigeants surconfiants agissent

---

<sup>8</sup>L’idée d’assurer la présence d’un genre d’“avocat du diable” au sein des équipes managériales est intéressante mais encore nouvelle dans les travaux académiques. L’intérêt de cette pratique serait de limiter la dissonance cognitive du dirigeant en l’incitant à considérer des scénarios alternatifs. De Vries (1990) a été un des premiers à discuter l’avantage d’avoir un “fou” organisationnel (en analogie avec le “fou du roi”) qui se sentirait libre d’exprimer ses opinions et faire preuve d’un “manque de respect salutaire” envers le dirigeant.

dans l'intérêt des actionnaires et réduisent le conflit d'agence lié à l'aversion au risque des dirigeants. Li and Tang (2010) confirment empiriquement cette intuition en démontrant une corrélation positive entre la surconfiance managériale et la prise de risque alors que Galasso and Simcoe (2011) montrent que le niveau d'innovation et d'investissement en recherche et développement est plus élevé dans les entreprises ayant un dirigeant surconfiant.

Un deuxième effet positif de la surconfiance managériale serait d'augmenter le niveau d'effort fourni par le dirigeant pendant son mandat. Au-delà des bénéfices motivationnels classiques (Bénabou and Tirole, 2002), l'avantage de ce biais se présente sous la forme d'une réduction de l'aléa moral quant à l'implication du dirigeant dans la réussite de l'entreprise et l'effort fourni par ce dernier (de Vries, 2011). Par ailleurs, en surestimant la performance future de l'entreprise le dirigeant surconfiant surestimerait également la valeur de sa rémunération variable (indexée à la performance). Gervais et al. (2011) montrent comment cela permet la mise en place de contrats de rémunération plus avantageux pour les actionnaires en rendant l'incitation des dirigeants à l'effort moins coûteuse.

Enfin, la troisième catégorie d'effets positifs de la surconfiance concerne son impact sur l'efficacité managériale du dirigeant. Malgré l'abondance des travaux sur le leadership, très peu d'articles posent précisément la question du rôle de la surconfiance dans l'attitude du dirigeant et dans sa performance en tant que leader. Une exception intéressante est le papier de Bolton et al. (2013) qui montre que la détermination du dirigeant, liée à sa confiance excessive en son information privée, pourrait agir comme un mécanisme d'engagement à maintenir au fil du temps une direction stratégique constante, facilitant ainsi la coordination des parties prenantes au sein de l'organisation. La surconfiance managériale est donc vue comme une qualité permettant au leader de recentrer les efforts de ses subordonnés. Van den Steen (2005) propose également une analyse des effets managériaux de la surconfiance en montrant comment les dirigeants surconfiants attirent des salariés ayant des croyances similaires et que cet alignement des préférences entre

différents niveaux hiérarchiques permet une meilleure efficacité organisationnelle. Pour finir, Gervais and Odean (2001) proposent un modèle théorique dans lequel la surconfiance d'un dirigeant permet une réduction du problème de passager clandestin. En surestimant l'apport de son effort personnel le dirigeant a toujours intérêt à agir (indépendamment de ses prévisions sur l'effort fourni par les autres). Anticipant cela, les autres agents seraient alors plus incités à fournir un effort eux-mêmes et le niveau d'effort collectif en serait accru. Pour résumer, la surconfiance permettrait l'émergence d'un " leadership par l'exemple" (Hermalin, 1998) profitable pour les actionnaires.

S'opposant à une vision exclusivement négative de la surconfiance managériale, ces trois catégories d'arguments mettent en évidence la difficulté de juger de l'impact global de ce biais sur la performance organisationnelle. Il est assez surprenant de constater que malgré la multitude d'études empiriques sur la question, il n'y a pour le moment pas de prédictions empiriques claires et consensuelles quant à l'impact global de la surconfiance d'un point de vue financier mais aussi opérationnel, stratégique et social. Certains auteurs défendent l'idée selon laquelle les dirigeants surconfiants permettent d'atteindre des performances organisationnelles extrêmes, positive comme négatives (Chatterjee and Hambrick, 2007; Hiller and Hambrick, 2005). D'autres suggèrent que l'effet global sur la performance est en réalité une affaire de dosage et qu'une surconfiance modérée est optimale pour les actionnaires parce que ce n'est qu'au-delà d'un certain niveau que celle-ci deviendrait néfaste et réduirait la valeur de l'entreprise (Campbell et al., 2011; Gervais et al., 2011; Goel and Thakor, 2008). Enfin, une dernière manière d'appréhender la pluralité des effets de la surconfiance managériale consiste à intégrer le contexte environnemental et économique de l'entreprise étudiée. Hirshleifer et al. (2012) montrent ainsi que, même si le surcroît d'innovation associé à la surconfiance managériale ne se traduit pas forcément par une augmentation de la valeur de l'entreprise, les dirigeants surconfiants saisissent mieux les opportunités de croissance dans les industries où l'innovation est importante. De même, Bolton et al. (2013) suggèrent que la focalisation autour d'une stratégie initiale, un attribut de la surconfiance managériale, est préférable dans les in-

dustries où la coordination des parties prenantes est plus importante que l'adaptabilité de l'entreprise à son environnement. Sur la base de ces différents arguments, il est possible d'avancer que l'optimalité de la surconfiance managériale dépendrait du couplage entre le degré de surconfiance (modéré versus extrême) et des facteurs contextuels (tels que l'industrie, les opportunités de croissance et d'innovation, l'amplitude des problèmes d'agence et la dépendance de l'entreprise au financement par fonds propres). De fait, cette contingence concernant les effets de la surconfiance managériale se démarque de la vision purement négative de la surconfiance managériale et invite à une étude plus approfondie et plus systématique quant aux effets de ce biais.

## 5 Conclusion

Un fossé de taille existe entre deux courants fondamentaux de la recherche économique contemporaine : d'un côté, les adeptes de l'homo economicus, qui considèrent que toute déviation d'un modèle de rationalité parfaite est automatiquement corrigée par le marché et donc éphémère ; de l'autre côté, les comportementalistes, qui s'efforcent d'exposer des irrationalités durables et fréquentes dans les comportements des agents en s'interrogeant malheureusement trop peu sur les raisons de leur pérennité. La littérature sur la surconfiance managériale reflète cette opposition. Dans cet article nous avons montré qu'il existe une réelle difficulté à réconcilier les deux approches. Pour expliquer la prédominance d'individus surconfiants au sein de la population des dirigeants, les travaux en finance et management stratégique doivent inévitablement remettre en question soit l'efficience des marchés des dirigeants et la qualité de la gouvernance des entreprises, soit les effets néfastes de l'irrationalité. Nous avons tenté de résumer les choix, souvent implicites, faits par la majorité des travaux sur le sujet. Par ailleurs, nous avons proposé une voie alternative consistant à nuancer l'aspect irrationnel du phénomène de la surconfiance managériale et montrer que dans certains cas, il pourrait s'agir tout simplement d'une stratégie d'affichage tout à fait rationnelle.

Un grand nombre de questions n'ont pas été abordées par cette revue de la littérature. L'une des plus importantes concerne l'effet macroéconomique de la surconfiance managériale. En particulier, quel est l'impact de la sur-représentation d'individus surconfiants dans la population des dirigeants sur les processus de recrutement, de remplacement et même de financement au sein des firmes (Manove and Padilla, 1999)? La proportion de dirigeants surconfiants dans une population donnée se reflète-t-elle dans la forme des contrats entre les agents (Vilanova, 2012), dans les pratiques et les dispositions légales de gouvernance, dans la structure hiérarchique des entreprises et ses procédures de promotion ? Quelles sont les implications socio-culturelles de la surconfiance managériale et ses effets en termes d'image collective du leader efficace ?

Notre objectif principal dans cet article était de contribuer à une vision plus claire des fondations conceptuelles et empiriques du paradigme de la surconfiance managériale. Toutefois, nous espérons également que notre analyse va inspirer des recherches futures et ce dans plusieurs directions. Une première piste concerne la distinction entre la surconfiance ressentie et la surconfiance affichée. L'enjeu est de nature technique (proposer des mesures innovantes qui excluent les stratégies d'affichage) mais aussi théorique (analyser l'effet de la surconfiance sur l'utilité globale et multi-temporelle d'un acteur). D'autres pistes peuvent concerner l'intégration des effets médiateurs multiples (financiers, stratégiques, managériaux, concurrentiels, motivationnels, etc.) dans une étude plus systématique de l'impact de la surconfiance managériale sur la performance organisationnelle. Enfin, il nous paraît important de souligner qu'en parallèle de l'étude de la surconfiance managériale de manière isolée, une prise en compte du contexte organisationnel et de l'interaction de la surconfiance avec d'autres facteurs individuels et environnementaux enrichiraient significativement notre connaissance sur le sujet.

## References

- Anderson, C., Brion, S., Moore, D. A., and Kennedy, J. A. (2012). A status-enhancement account of overconfidence. *Journal of Personality and Social Psychology*, 103(4):718–735.
- Anderson, C. and Galinsky, A. D. (2006). Power, optimism, and risk-taking. *European Journal of Social Psychology*, 36(4):511–536.
- Banerjee, S., Humphery-Jenner, M., and Nanda, V. (2013). Restraining overconfident CEOs. *UNSW Australian School of Business Research Paper*, (2013).
- Ben-David, I., Graham, J. R., and Harvey, C. R. (2013). Managerial miscalibration. *The Quarterly Journal of Economics*, 128(4):1547–1584.
- Ben-David, I., Harvey, C. R., and Graham, J. R. (2007). Managerial overconfidence and corporate policies. *NBER Working Paper*, (w13711).
- Bénabou, R. and Tirole, J. (2002). Self-confidence and personal motivation. *Quarterly Journal of Economics*, pages 871–915.
- Bernardo, A. E. and Welch, I. (2001). On the evolution of overconfidence and entrepreneurs. *Journal of Economics & Management Strategy*, 10(3):301–330.
- Bessière, V. (2007). Excès de confiance des dirigeants et décisions financières: une synthèse. *Finance Contrôle Stratégie*, 10(1):39–66.
- Billett, M. T. and Qian, Y. (2008). Are overconfident CEOs born or made? evidence of self-attribution bias from frequent acquirers. *Management Science*, 54(6):1037–1051.
- Bollaert, H. and Petit, V. (2010). Beyond the dark side of executive psychology: Current research and new directions. *European Management Journal*, 28(5):362–376.

- Bolton, P., Brunnermeier, M. K., and Veldkamp, L. (2013). Leadership, coordination, and corporate culture. *The Review of Economic Studies*, 80(2):512–537.
- Brown, R. and Sarma, N. (2007). CEO overconfidence, CEO dominance and corporate acquisitions. *Journal of Economics and Business*, 59(5):358–379.
- Burks, S. V., Carpenter, J. P., Goette, L., and Rustichini, A. (2013). Overconfidence and social signalling. *The Review of Economic Studies*, 80(3):949–983.
- Campbell, T. C., Gallmeyer, M., Johnson, S. A., Rutherford, J., and Stanley, B. W. (2011). CEO optimism and forced turnover. *Journal of Financial Economics*, 101(3):695–712.
- Cesarini, D., Lichtenstein, P., Johannesson, M., and Wallace, B. (2009). Heritability of overconfidence. *Journal of the European Economic Association*, 7(2-3):617–627.
- Chatterjee, A. and Hambrick, D. C. (2007). It’s all about me: Narcissistic chief executive officers and their effects on company strategy and performance. *Administrative Science Quarterly*, 52(3):351–386.
- De la Rosa, L. E. (2011). Overconfidence and moral hazard. *Games and Economic Behavior*, 73(2):429–451.
- de Vries, M. F. K. (1990). The organizational fool: Balancing a leader’s hubris. *Human Relations*, 43(8):751–770.
- de Vries, M. F. K. (2011). *The leader on the couch: A clinical approach to changing people and organizations*. John Wiley & Sons.
- Galasso, A. and Simcoe, T. S. (2011). CEO overconfidence and innovation. *Management Science*, 57(8):1469–1484.
- Gervais, S. and Goldstein, I. (2007). The positive effects of biased self-perceptions in firms. *Review of Finance*, 11(3):453–496.

- Gervais, S., Heaton, J., and Odean, T. (2011). Overconfidence, compensation contracts, and capital budgeting. *The Journal of Finance*, 66(5):1735–1777.
- Gervais, S. and Odean, T. (2001). Learning to be overconfident. *Review of Financial Studies*, 14(1):1–27.
- Goel, A. M. and Thakor, A. V. (2008). Overconfidence, CEO selection, and corporate governance. *The Journal of Finance*, 63(6):2737–2784.
- Graham, J. R., Harvey, C. R., and Puri, M. (2013). Managerial attitudes and corporate actions. *Journal of Financial Economics*, 109(1):103–121.
- Hall, B. J. and Murphy, K. J. (2000). Optimal exercise prices for executive stock options. *American Economic Review*, 90(2):209–214.
- Hayward, M. L. and Hambrick, D. C. (1997). Explaining the premiums paid for large acquisitions: Evidence of CEO hubris. *Administrative Science Quarterly*, pages 103–127.
- Hayward, M. L., Rindova, V. P., and Pollock, T. G. (2004). Believing one’s own press: The causes and consequences of CEO celebrity. *Strategic Management Journal*, 25(7):637–653.
- Hayward, M. L., Shepherd, D. A., and Griffin, D. (2006). A hubris theory of entrepreneurship. *Management Science*, 52(2):160–172.
- Hermalin, B. E. (1998). Toward an economic theory of leadership: Leading by example. *American Economic Review*, pages 1188–1206.
- Hilary, G. and Menzly, L. (2006). Does past success lead analysts to become overconfident? *Management Science*, 52(4):489–500.
- Hiller, N. J. and Hambrick, D. C. (2005). Conceptualizing executive hubris: the role of (hyper-) core self-evaluations in strategic decision-making. *Strategic Management Journal*, 26(4):297–319.

- Hirshleifer, D., Low, A., and Teoh, S. H. (2012). Are overconfident CEOs better innovators? *The Journal of Finance*, 67(4):1457–1498.
- Hribar, P. and Yang, H. (2010). Does CEO overconfidence affect management forecasting and subsequent earnings management. *Unpublished working paper University of Iowa*.
- Johnson, D. D. and Fowler, J. H. (2011). The evolution of overconfidence. *Nature*, 477(7364):317–320.
- Keltner, D., Gruenfeld, D. H., and Anderson, C. (2003). Power, approach, and inhibition. *Psychological Review*, 110(2):265–284.
- Khurana, R. (2002). *Searching for a corporate savior: The irrational quest for charismatic CEOs*. Princeton University Press.
- Leary, M. R. and Kowalski, R. M. (1990). Impression management: A literature review and two-component model. *Psychological Bulletin*, 107(1):34–47.
- Li, J. and Tang, Y. (2010). CEO hubris and firm risk taking in china: The moderating role of managerial discretion. *Academy of Management Journal*, 53(1):45–68.
- Malmendier, U. and Tate, G. (2005). CEO overconfidence and corporate investment. *The Journal of Finance*, 60(6):2661–2700.
- Malmendier, U. and Tate, G. (2008). Who makes acquisitions? CEO overconfidence and the market’s reaction. *Journal of Financial Economics*, 89(1):20–43.
- Manove, M. and Padilla, A. J. (1999). Banking (conservatively) with optimists. *The RAND Journal of Economics*, pages 324–350.
- Moore, D. A. and Healy, P. J. (2008). The trouble with overconfidence. *Psychological review*, 115(2):502–517.
- Owen, D. and Davidson, J. (2009). Hubris syndrome: An acquired personality disorder? a study of US presidents and UK prime ministers over the last 100 years. *Brain*, 132(5):1396–1406.

- Paredes, T. A. (2005). Too much pay, too much deference: Behavioral corporate finance, CEOs, and corporate governance. *Florida State University Law Review*, 32(2):673–1415.
- Radzevick, J. R. and Moore, D. A. (2011). Competing to be certain (but wrong): Market dynamics and excessive confidence in judgment. *Management Science*, 57(1):93–106.
- Roll, R. (1986). The hubris hypothesis of corporate takeovers. *Journal of Business*, pages 197–216.
- Russo, J. E. and Schoemaker, P. J. (1992). Managing overconfidence. *Sloan Management Review*, 33(2):7–17.
- Taylor, S. E. (1989). *Positive illusions: Creative self-deception and the healthy mind*. Basic Books.
- Tenney, E. R., Spellman, B. A., and MacCoun, R. J. (2008). The benefits of knowing what you know (and what you don’t): How calibration affects credibility. *Journal of Experimental Social Psychology*, 44(5):1368–1375.
- Trivers, R. (2010). Deceit and self-deception. In *Mind the gap*, pages 373–393. Springer.
- Van den Steen, E. (2005). Organizational beliefs and managerial vision. *Journal of Law, Economics, and Organization*, 21(1):256–283.
- Vilanova, L. (2012). Financing and managerial support with (some) optimistic entrepreneurs. *Papier présenté à l’European Finance Association (EFA), Copenhagen*.
- Wang, F. A. (2001). Overconfidence, investor sentiment, and evolution. *Journal of Financial Intermediation*, 10(2):138–170.
- Yaniv, I. and Foster, D. P. (1997). Precision and accuracy of judgmental estimation. *Journal of Behavioral Decision Making*, 10(1):21–32.
- Zarnoth, P. and Snizek, J. A. (1997). The social influence of confidence in group decision making. *Journal of Experimental Social Psychology*, 33(4):345–366.

# II. Nurturing CEO overconfidence: the dynamics of corporate governance, managerial beliefs and firm performance

*Those in possession of absolute power can not only prophesy and make their prophecies come true, but they can also lie and make their lies come true.*

- Eric Hoffer

## 1 Introduction

Recent academic research has labeled overconfidence as one of the most prominent characteristic of CEOs and biased visions of the future by top executives is now an acknowledged stylized fact. In most of this literature CEO overconfidence is viewed as an individual trait that consists in the tendency to systematically overestimate one's knowledge, information and ability to predict the future. How this trait emerges and why some individuals and not others develop this kind of cognitive bias is however an open question.

An old debate in social psychology about the dualism between the innate origins of human traits as opposed to empiricism or nurture as an explanation of human differences can be an interesting starting point to answer this question. Are overconfident individuals “born” i.e., they carry in their personality a natural tendency to make biased predictions or are all individuals “tabula rasa” at birth and some of them become overconfident as result of education, experience and context.

---

I would like to thank the participants of the 2014 Eastern Finance Association Meeting and of the 2014 AFFI Conference for helpful comments and ideas. I am particularly grateful to referee Marie-Hélène Broihanne who suggested the robustness checks and improvements presented in Appendix.

Seeing overconfidence as an innate individual characteristic matches with a traditional explanation of the prominence of the overconfidence bias among CEOs according to which the recruitment or the selection process of corporate executives facilitates the access of overconfident individuals to top leadership positions. This could take the form of internal tournaments that favor risk takers (Goel and Thakor, 2008) or the board’s search for charismatic leaders (Khurana, 2002) or it can even pass through the capacity of overconfident individuals to have stronger social influence and convince others of their managerial qualities (Radzevick and Moore, 2011; Zarnoth and Snizek, 1997). In contrast, the explanation of overconfidence as a belief that is generated by experience and context, a “nurtured” cognitive bias, would suggest some new insights as to the reasons of CEO hubris. If the development of biased thinking is related to different sorts of social experiences, position and previous practice, then companies’ specifics as much as individual characteristics would be likely to induce, reveal or reinforce CEO overconfidence.

In this paper we focus on the nurtured origins of overconfidence and argue that CEO hubris is related not only to CEOs’ personalities, but also to corporate features such as power allocation, quality of corporate governance and entrenchment opportunities. Our conjecture is that the coupling between firms and their CEOs is driven by both the CEO’s temperament and the firm’s particularity and thus follows a deterministic path. The major implication of this hypothesis is that the study of the consequences of CEO overconfidence in terms of firm performance must take into consideration the determinism of this coupling. On the ground of this reasoning, we propose an empirical model that addresses this issue and aims to measure the selection-free effect of CEO overconfidence on firm performance.

We explore the dynamics of CEO overconfidence and its value consequences on a firm level. The CEOs’ stock options exercise behavior during a specific period of time is used to identify the year at which a CEO becomes overconfident (Malmendier and Tate, 2005).

The precise moment at which CEOs start to make excessively positive predictions about their companies (become overconfident) is difficult to determine. Instead we use the Malmendier and Tate (2005)’s methodology of detecting overconfident individuals, for each year of our sample period, and set the date at which a specific CEO becomes overconfident at the first year at which he was qualified as overconfident according to this measure. Malmendier and Tate’s measure of overconfidence builds upon the idea that undiversified CEOs should generally exercise their stock options quite early in time as long as a certain level of moneyness is assured. Not exercising stock-options when reasonable (Hall and Murphy, 2002) would suggest that the CEO makes (excessively) positive predictions about the company’s future and waits for more favorable stock prices. This would classify him as overconfident and we would consider the year during which he was first qualified as overconfident as the specific event year in our study.

One caveat to this empirical strategy is that it suggests a rapid conversion of a CEO from realistic to overconfident. Whatever the reasons leading to the development of overconfident beliefs, this process is necessarily gradual and ongoing. Hence, identifying a lap of time during which the CEO would turn to overconfident can be problematic. We are able to partly alleviate this concern by insisting on long term changes in performance rather than short event windows in our analysis of the consequences of this gradual mutation. An alternative way of seeing this issue is to consider the event year as the period during which the CEO’s level of confidence over-passed a specific benchmark level that is implicitly identified as the optimal one. We then use the event of becoming overconfident as a reference point starting from which we link changes in performance to the CEOs psychological profile. In parallel, the event of becoming overconfident is the major element of the strategy we employ to identify reasonable counterfactuals, i.e., similar CEOs who evolve in similar firms and whose risk of becoming overconfident at a given year is comparable. Our empirical method consists in running a propensity score nearest neighbor matching (Rosenbaum and Rubin, 1983) that allows the construction of a control sample of matched individuals which will serve as a benchmark in our analysis of the changes in

firm performance since the conversion of the CEO to an overconfident one.

The results of this paper support the notion that CEO overconfidence is strongly conducted by corporate factors such as managerial power, governance and past firm performance. We find that the quality of the corporate governance and factors influencing the authority of the CEO in the decision making processes such as his role as a Chairman or President of the Board and his involvement in the founding of the company strongly influence the probability of developing an overconfidence bias. Other personal characteristics that would proxy life or professional experience also matter, corroborating the idea of overconfidence as a behaviorist, nurtured individual trait. We also highlight the role of self-attribution as one of the main originators of overconfidence (Baker et al., 2004; Kahneman and Tversky, 1979) since past firm performance and tenure increase the probability of having an overconfident CEO.

Firms with overconfident CEOs were found to outperform similar firms whose CEOs hadn't changed to overconfident. Operating performance, measured as returns on assets and returns on equity varies more positively for firms with overconfident CEOs. This difference can be observed up to two years after the CEO became overconfident suggesting a durable effect of overconfidence on the company's operational performance. The value of the firm, measured by the Tobin's Q ratio also seems to be affected by the CEO's psychological profile as our measure of overconfidence seem to explain a significant positive difference in the evolution of this ratio between firms with overconfident CEOs and firms with realistic CEOs.

The results are similar when we compute abnormal stock performance using market model returns. Cumulative abnormal returns of firms with overconfident CEOs are significantly higher than those of firms with realistic CEOs suggesting that the investors positively react to CEO overconfidence. This result holds for the period of 750 trading days (three years) after the event of becoming overconfident, suggesting that although

the market takes some time to recognize and react to CEO overconfidence the effect is long-lasting. We validate these results by computing the abnormal performance of a zero investment value weighted portfolio which is long in firms whose CEOs became overconfident between 2006 and 2010 and short in firms whose CEOs remained realistic during the same period. We regressed the monthly returns of this portfolio to the four factors (Carhart, 1997; Fama and French, 1993) and found a positive alpha confirming that firms with overconfident CEOs outdo firms with realistic CEOs in terms of stock market profitability.

One of the major implications of these results concerns corporate governance. We show that the degree of managerial protection in a given firm can stimulate the emergence of CEO overconfidence. Considering the globally positive effects of this bias, this is not necessarily a bad thing. In this sense, our results suggest that CEO overconfidence can be an interesting substitute to the disciplinary mechanisms of corporate governance that align the interests of corporate shareholders and executives (Gervais et al., 2011; Goel and Thakor, 2008).

The reminder of the paper is organized as follows. In Section I we develop a theoretical reasoning over the origins of overconfidence and the endogeneity of this belief in the corporate context. In Section II we introduce the data and the construction of our measures. We also present our empirical design and the matching procedure that alleviate concerns related to the endogeneity of CEO overconfidence. Section III presents the results concerning the relationship between CEO overconfidence and corporate performance. Section IV addresses the substitutability between CEO overconfidence and corporate governance as determinants of financial performance. In Section IV we discuss the results and conclude.

## 2 The endogeneity of CEO overconfidence

The reason why some people demonstrate overconfident beliefs whereas others do not is an issue of open debate. The main question behind this debate is whether overconfident individuals are “born” - they have inherent predispositions to overestimate their capacities and systematically do so whatever the task they are confronted to, or - “made” - their overconfident beliefs emerge from their lifetime experience, their current position, decision power and amount of control they believe to have over future events. The first argument, defining overconfidence as an intrinsic tendency of the individual has found its grounds in behavioral genetics. In an interesting empirical study comparing 460 twin pairs, Cesarini et al. (2009) suggest that genetic differences explain 16 to 34% of the variation in overconfidence among individuals. In this sense, some individuals, and not others would be predisposed to make overconfident beliefs whatever the context, tasks, and environment they are confronted to. Then, the prevalence of overconfident individuals among specific populations such as entrepreneurs (Busenitz, 1999; Cooper et al., 1988), top executives (Malmendier and Tate, 2005, 2008; Ben-David et al., 2007; Hiller and Hambrick, 2005) analysts (Chen and Jiang, 2006; Hilary and Menzly, 2006) or experts (Griffin and Varey, 1996; Klayman et al., 1999) would be related to the assortment of these specific individuals around forecast-oriented, highly selective professions that call to a great level of risk-taking. In this sense, Goel and Thakor (2008) explain the stylized fact of overconfident CEOs building on the specificity of the process of internal tournament for the position of CEO which would ensure that it is the most overconfident intermediate executives (who are most prompt to invest in highly risky and value generating projects) that are most likely to win the tournament and become corporate leaders.

Alternatively, some academics insist on the relevance of environmental and contextual factors that enhance or on the contrary moderate the natural tendency of the individual to be overconfident. The endogenous emergence of overconfident beliefs, based on life experience, has been widely argued in psychology, socio-cognitive theory and behavioral economics. Two important arguments lie behind the “made” overconfident hypothesis.

The first one is a widely explored human cognitive bias called *self-attribution* (Baker et al., 2004; Gilovich et al., 2002). Self-attribution bias concerns the individuals' predisposition to overestimate their contribution in past successes and underestimate their fault in unsuccessful experiences, blaming exogenous reasons such as bad luck or hazardous turn of events. Individuals with successful career paths and positive past experience would thus attribute all past accomplishments to themselves and would be more at risk of developing overconfidence. Several studies have empirically demonstrated the manifestation of self-attribution bias among successful individuals. Daniel et al. (1998) show that investors become overconfident after several valuable investments and Hayward and Hambrick (1997) suggest that "the aura of conquest" of acquiring executives may give them great confidence in their managerial abilities and make them believe they can fully manage the acquired firm on their own. Similarly, Billett and Qian (2008) argue that the reduced financial benefits of subsequent acquisitions of frequent acquirers can be explained by the emergence or the development of an overconfidence bias among CEOs who have previously conducted successful mergers and acquisitions and excessively attribute this past success to their personal involvement. Gervais and Odean (2001) and Hilary and Menzly (2006) also argue that successful investors/analysts become overconfident as they take too much credit for their value-creating investments or accurate forecasts.

The second important element of the idea of overconfidence as the product of nurture is *illusion of control* (Langer, 1975). Illusion on control has been defined as the tendency to overestimate one's personal control over future events and the extent to which future events depend on the person's skill rather than luck or other people's involvement. In this sense, this belief is related to the individual's sense of power as well as his vision about his personal influence on future events. The corporate context emphasizes this kind of cognitive biases because the power of the CEO when it comes to deciding the strategic and financial direction of the company and the lack of resistance by shareholders or other corporate stakeholders often encourage a feeling of mastery and controllable future.

In several empirical studies power and the heightened sense of power have been shown to increase optimism and positive thinking: Anderson and Galinsky (2006) propose an experimental analysis of the effect of power on people's attitude towards risk and actual risk taking, whereas building upon the Approach/Inhibition model Keltner et al. (2003) argue that possessing power activates an approach-related behavior that is characterized by stronger optimism over future events, reward seeking and the tendency to underestimate risk. This dis-inhibiting role of power can thus lead to strong beliefs about one's capacity to have control over future events and guarantee successful outcomes.<sup>1</sup> Fast et al. (2012) actually suggest two mechanisms through which power may lead to overconfidence: the first one is that power activates a sense of positive and action-facilitating cognitions such as self-serving beliefs or optimism. The second mechanism concerns the role expectations felt by power holders. People who have been granted power might exhibit extreme confidence in order to correspond to what they believe would be the expected attitude from those in their position. Eventually, this expressed overconfidence can become self-fulfilling and the individuals' stated confidence would end up corresponding to their core beliefs.<sup>2</sup> By the same reasoning, Paredes (2004) argues that one of the main reasons explaining the prevalence of overconfident individuals among corporate leaders is the deference and the lack of contestation of CEOs by their boards, shareholder or broader financial community. CEO overconfidence is thus seen as the product of weak corporate governance that limits the shareholders opportunities to challenge or question the CEO's decision making and increases the concentration of corporate control in the hands of one decision maker (the manager) whose business judgment shareholders defer to. Weak corporate governance would then not only reinforce the feeling of power and dominance over the

---

<sup>1</sup>Alternatively, it might also be argued that lacking power would be associated with higher propensity to take risks. Consistent with prospect theory (Kahneman and Tversky, 1979) the powerless individuals can see themselves in the domain of losses and have a risk seeking attitude. We believe that this argument is strongly associated with the durability of power. A powerful individual who is unlikely to lose power because of his actions would be less likely to be in the "nothing to lose attitude" whereas a less "entrenched" power holder would remain more careful. In this sense, entrenchment can be seen as an important moderator of the relationship between power and overconfident predictions or risk taking.

<sup>2</sup>In an inspiring article Trivers (2000) argues that self-deception (a general trait that includes overconfidence) may have an evolutionary function as it serves to improve deception of others and thus increase the survivor likelihood of the self-deceived (overconfident) individuals.

course of events that the CEO may resent, but more dangerously, it would facilitate his entrenchment and reduce the necessity of precaution and continuous cross-validation of decisions in the corporate context. This in turn would lead to the development of a strong and persistent overconfidence bias among top executives.

Of course self-attribution bias and illusion of control are inter-correlated; the first one consists in underestimating the part of hazard or others' involvement in past successes while the second one is about underestimating their role in the chances of future ones. The feeling of power and mastery that accompany the illusion of control would furthermore nurture upcoming self-attribution tendencies. Because CEOs level of (over)confidence evolves in time, nurtured by positive feedback and the conquest of stronger position and entrenchment, the study of this belief's consequences must take into consideration this endogeneity. In the empirical analysis that follows we analyze CEO overconfidence as an endogenously generated belief, a product of the CEO's past and the company characteristics. The next section explains the selection bias issue related to such endogeneity and our approach to treat this problem. Then we present our empirical results and discuss their implications.

### **3 Empirical strategy**

In the ideal empirical experiment, testing the effects of CEO's overconfidence on the performance of the firm would consist in comparing the performance of a firm whose CEO has become overconfident to the performance of the very same firm had the CEO not become overconfident. Unfortunately, this counterfactual is unavailable and most of the studies that aim to evaluate the consequences of overconfidence make cross sectional comparisons between the performance of firms with overconfident CEOs and that of firms with CEOs who do not demonstrate this sort of biased perceptions. This methodology would suggest that the event of a CEO becoming overconfident is completely random among firms and individuals and can be seen as the exclusive element of distinction between the firms with overconfident CEOs and the other ones. As we argued above we

believe that this hypothesis is too strong. Even if we considered overconfidence as an individual intrinsic trait that would be unaffected by the corporate context, the matching between specific firms and their leaders’ psychological profile might be deterministic and thus bias the results of simple comparisons between firm-level performances of overconfident and non-overconfident leaders.

In order to address this issue, we rely on a quasi-experimental empirical design by comparing a group of overconfident CEOs to a group of CEOs who were equally likely to become overconfident (were in similar corporate context and presented similar individual characteristics) but did not presented signs of this cognitive bias. We thus construct two sub-samples of CEOs, those who reveal overconfidence during a specific sample years (O) and a control group that differs from the group of overconfident CEOs only by the fact that the members of this group were not identified as overconfident. These two sub-samples are constructed based on a propensity score matching approach that we describe below. Once we have established the group of overconfident CEOs and their alike control group we compare the changes in performance from before the moment the CEO became (or was at risk to become) overconfident to several periods after this event for each group. If there is a significant difference between the two groups, this would suggest that two firms that are essentially different only by the fact that one’s CEO became overconfident while the other one’s didn’t, perform differently. In other words, this would allow us to measure the selection-free effect of CEO overconfidence on firm performance.<sup>3</sup>

### 3.1 Sample construction and measures

We use the Capital IQ database over the period 2005-2013. Our sample contains 741 CEO of 736 US public companies, from all industries as described in table 1. The total number of observations after removing all the missing data corresponds to 2175 CEO-years. Our measure of CEO overconfidence is fully inspired by a seminal work of Malmendier and Tate (2005) that proposes a proxy of CEO’s upward biased forecasts about

---

<sup>3</sup>This empirical strategy is similar to Malmendier and Tate (2009)’s article that studies the effect of CEOs’ celebrity on corporate performance.

the future of their companies by analyzing the way they exercise their stock options packages. The idea behind this proxy is the following: an undiversified risk-averse CEO would presumably exercise his stock options quite early after the vesting period in order to reduce the prominence of firm specific risk in his personal portfolio. Hall and Murphy (2002) propose a simulation-based reference sheet with threshold levels of moneyness for each year of stock option's exercisability above which rational CEOs should exercise their options packages. For example, when a stock option package is in its fifth year of exercisability, rational CEOs with a risk aversion level ( $\rho$ ) of three in a constant relative-risk aversion utility specification and a percentage of wealth in the company's equity of 66% have full incentives to exercise these packages as soon as they are 67% in-the-money. This specific fifth year threshold level is the one used by Malmendier and Tate to designate overconfident CEOs. In their framework, a CEO would be qualified as overconfident if he fails to exercise stock options that are in their fifth year of exercisability and above 67% in-the money, at least twice during the sample period. This measure of CEO overconfidence, called *Holder67*, has nurtured several subsequent studies of CEO overconfidence and has been widely accepted by the academic community.<sup>4</sup>

Because we dispose of each CEO's stock options packages for every year in the sample period, we extend the Malmendier and Tate (2005) *Holder67* measure and take into consideration the CEO's decision to exercise or hold his stock-options for each year of exercisability of the package during our sample period. In other words, we do not limit our analysis to decisions about stock options packages that are in the fifth year of exercisability but compare the moneyness of stock options to the specific year's Hall and Murphy (2002) threshold, whatever the year of exercisability. Thus a CEO in our sample could have the opportunity to exercise the same package of stock options at the rational threshold level of moneyness several times during the sample period. Analogously to the Malmendier and Tate (2005)'s case, a CEO who has stock-options that are above 67% in-the money at the fifth year of exercisability and fails to exercise them could be in a sim-

---

<sup>4</sup>For more references using the *Holder67* measure see Ahmed and Duellman (2013), Campbell et al. (2011), Galasso and Simcoe (2011).

ilar situation the year that follows if his stock options are now above 62% in-the-money, which is the corresponding threshold for stock options in their sixth year of exercisability. Based on this year-by-year analysis we construct a time variant measure of overconfidence in the following way: We take only CEOs who at least twice during our sample period had one or more stock-option package(s) that were above the specific years's moneyness threshold.<sup>5</sup> Then, a specific CEO is qualified as overconfident in a given sample year if he: (i) fails to exercise partly or completely at least one stock option package that is above the year's threshold level and (ii) has this very same behavior at least one more time in a subsequent year of the sample period. Apart from being addressed annually, the design of this measure is equivalent to Malmendier and Tate's *Holder67* proxy. Thus, our sample only contains CEOs who had the opportunity to demonstrate overconfidence or rationality (could rationally exercise their stock options at least twice in the sample period). Furthermore, by imposing repetition in the lack of exercise of stock-options we make sure that our measure of overconfidence does reflect the CEOs anticipation on the company's equity future evolution rather than one-shot mistakes, procrastination or inside information. We call this time variant alternative to the *Holder67* measure, *HolderAboveThreshold*. In what follows we will call Overconfident CEOs, those whose value of the *HolderAboveThreshold* proxy equals to 1 for the specific sample year.

Since most of the CEOs in our sample have several stock options packages during each sample year it is possible that a given CEO would exercise some of the packages that are above the specific year's threshold and fail to exercise other packages of this kind during the very same period. Our *HolderAboveThreshold* measure would qualify all these CEOs as overconfident provided that they subsequently fail to exercise alike options at least one more time (even if they do demonstrate rational exercising behavior on some of their packages). An alternative way of considering this particular case is to set a rule

---

<sup>5</sup>According to Hall and Murphy (2002)'s benchmark, annual moneyness thresholds for CEOs with a risk aversion of three and a part of wealth related to company's equity of 66% would be around: 83% for the first year of exercisability, 80% for the second year of exercisability, 77% for the third year, 72% for the fourth year, 67% for the fifth year, 62% for the sixth year, 53% for the seventh year, and so on up to an at-the-money level for the last year of exercisability.

that would qualify as overconfident the CEOs for who the number of above threshold packages that they fail to exercise is superior to the number of above threshold packages they do exercise. We call this alternative measure of overconfidence *HolderAboveThreshold2*. The degree of correlation between the two alternative measures is of 0.98 (significant at the 1% level) so we only keep the first alternative for the subsequent empirical analysis.<sup>6</sup>

We match the CEO overconfidence data with additional data on CEO characteristics, firm characteristics and firm performance. We consider CEO's demographic features (age, gender and education) as well as the CEO's tenure in the company (in number of months since he was first assigned to the position of CEO), the CEO's total annual cash compensation measured as salary plus bonus plus all other cash compensation. We also include three variables that can be seen as factors influencing CEO power and decision rights within the firm: a dummy variable equal to one if the CEO is also the founder of the company, a dummy variable equal to one if he is also Chairman of the Board and President and a dummy variable equal to one if the CEO owns the majority (above 50%) of the company's equity.

Then we merge individual level measures with some company characteristics. Market capitalization is the stock price multiplied by common shares outstanding. The book-to-market ratio is book equity over market equity. Return on assets (ROA) is Operating income scaled by Total Assets and Return on Equity (ROE) is Earnings scaled by Total Equity. We also measure the value of the firm by the Tobin's Q ratio equal to the market value of assets (total assets plus market equity minus book equity) over the book value of assets. Market equity corresponds to common shares outstanding multiplied by the fiscal year closing price. Book equity corresponds to shareholder's total equity plus balance sheet preferred taxes and investments minus post-retirement assets minus preferred stock

---

<sup>6</sup>We perform several robustness checks related to the *HolderAboveThreshold* measure. First, we retest all our empirical models by increasing all annual exercisability thresholds by 20% and then 50%. Similarly, we compare our overconfidence measure annual results to the *LongHolder* measure suggested by Malmendier and Tate (2005). While generally confirmed, results are somewhat weaker in this case and we choose not to report them here.

liquidating value.

Corporate governance is measured by the 24 items G-index as proposed by Gompers et al. (2003). This index takes into consideration different corporate legal anti-takeover provisions from the Investor Responsibility Research Center (IRRC) including: Indemnification Contracts, Limitation on Director Liability, Supermajority requirements, Limitations on actions upon written consent and so on. All these provisions are designed to protect the corporate executives and assure them stronger power so the stronger the GIM index the weaker the company’s corporate governance. We also include the 6-items ”Entrenchment Index” proposed by Bebchuk et al. (2009) that resumes the main drivers of the positive effect of corporate governance quality on financial performance. This index is a compact version of the G-index and contains essentially provisions that protect the managers from forced turnover. At last we add a dummy variable Block that equals one when the major institutional shareholder in the company possess at least 5% of the shares of the company. This measure has been proposed by Cremers and Nair (2005) as a proxy of internal governance quality (as opposed to the external governance quality measured by the G-index). The argument behind this measure builds on the fact that institutional block-holders have both strong incentives and high aptitude to monitor the managers’ behavior and decision-making.

### **3.2 Empirical design**

In order to isolate the effect of overconfidence on performance from selection bias and the endogeneity of overconfidence described above we construct a propensity score matching estimator (Rosenbaum and Rubin, 1983; Abadie and Imbens, 2007). We match overconfident CEOs to their alike realistic counterparts (that we call Predicted Overconfident CEOs) for each sample year. The remaining heterogeneity between the overconfident CEOs (treated sample) and the Predicted Overconfident CEOs (control sample) might bias our results, so we test for differences between overconfident CEOs and their matches along other variables that are not included in the matching procedure. Table 2 summa-

rizes this analysis.

Table 1: Determinants of Overconfidence

|                           | Odds<br>Ratios | Std.<br>Errors | Odds<br>Ratios | Std.<br>Errors |
|---------------------------|----------------|----------------|----------------|----------------|
| Age                       | -0.179         | (0.067)***     | -0.104         | (0.071)        |
| Age2                      | 0.001          | (0.001)**      | 0.001          | (0.001)        |
| Female                    | -0.577         | (0.268)**      | -0.726         | (0.284)**      |
| MBA (dummy)               | 0.522          | (0.107)***     | 0.557          | (0.115)***     |
| Tenure (in n° of months)  | 0.000          | (0.000)**      | 0.000          | (0.000)*       |
| Cash Compensation         | 0.000          | (0.000)**      | 0.000          | (0.000)*       |
| Founder (dummy)           | 0.159          | (0.100)        | 0.023          | (0.1092)       |
| CEO owns majority (dummy) | 0.033          | (0.107)        | 0.200          | (0.116)*       |
| Chm., pres. & CEO         | -0.089         | (0.095)        | -0.174         | (0.103)*       |
| GIM index                 | 0.042          | (0.017)**      | 0.039          | (0.018)**      |
| ROA[-1]                   | 0.005          | (0.006)        | -0.004         | (0.006)        |
| ROE[-1]                   | -0.005         | (0.002)**      | 0.001          | (0.002)        |
| Tobins' Q [-1]            | 0.216          | (0.033)***     | 0.140          | (0.034)***     |
| Industry Dummies          | No             |                | Yes            |                |
| Year Dummies              | No             |                | Yes            |                |
| Pseudo R2                 | 0.0648         |                | 0.1582         |                |
| Observations              | 2175           |                | 2175           |                |

*Notes.* The sample includes all firms in each year from 2006 to 2012. The dependent variable is a dummy variable (*HolderAbove Threshold*) equal to one when a CEO fails to exercise at least one stock option package that is above the year's threshold level and presents the same behavior at least one more time in a subsequent year of the sample period. Cash compensation is salary plus bonus, CEO owns majority is a dummy variable equal to one if the CEO owns at least 50% of the company's equity, Chm., pres. & CEO is a dummy variable equal to one of if the CEO is also Chairman and President of the Board. GIM index is a governance index as in Gompers et al. (2003). ROA[-1] is the company's Return on Assets at the end of the fiscal year prior to the measure of overconfidence, defined as Operating income divided by Total Assets, ROE[-1] is the company's Return on equity at the end of the fiscal year prior to the measure of overconfidence, defined as Earnings divided by Total Equity. Tobin's Q [-1] is the ratio of market value of assets over book value of assets at the end of the fiscal year prior to the measure of overconfidence.

We construct the matching sample of individuals named Predicted Overconfident CEOs in two steps. First, we run a probit regression to predict the probability that a specific CEO would become overconfident in a given year based on his personal characteristics (age, education, tenure, compensation) as well as the corporate context and past financial performance. Table 1 presents the results of this regression, both with and without year and industry fixed effects. The coefficients in the table, shown as odds ratio, confirm that the probability that a CEO would become overconfident in a specific year is endogenously conducted by several individual and firm characteristics as well as feedback about the firm's performance. A younger, more educated, male CEO who has been in

Table 2: Summary statistics

|                             | Overconfident CEOs(O) |         |          | Predicted overconfident CEOs(P) |      |         | All non-overconfident CEOs(A) |          |             | Diff. in means             |
|-----------------------------|-----------------------|---------|----------|---------------------------------|------|---------|-------------------------------|----------|-------------|----------------------------|
|                             | Obs.                  | Mean    | Median   | Std.Dev.                        | Obs. | Mean    | Median                        | Std.Dev. | Obs.        | p(O-P)p(O-A)               |
| <b>Match variables</b>      |                       |         |          |                                 |      |         |                               |          |             |                            |
| Founder (dummy)             | 912                   | 0.406   | 0.491    | 0.000                           | 912  | 0.404   | 0.491                         | 0.000    | 18610.356   | 0.479 0.000 0.9240 0.0127  |
| Female                      | 912                   | 0.025   | 0.157    | 0.000                           | 912  | 0.023   | 0.150                         | 0.000    | 18610.035   | 0.185 0.000 0.7604 0.2346  |
| MBA (dummy)                 | 912                   | 0.294   | 0.456    | 0.000                           | 912  | 0.309   | 0.462                         | 0.000    | 18610.218   | 0.413 0.000 0.4753 0.0000  |
| Age                         | 912                   | 50.5887 | 286      | 49.00                           | 912  | 50.1686 | 755                           | 50.000   | 186251.5467 | 249 51.00 0.2019 0.0002    |
| Age2                        | 912                   | 2612    | 760      | 2401                            | 912  | 2562    | 698                           | 2500     | 18622709    | 764 2601 0.1454 0.0003     |
| Cash Compensation (in K\$ ) | 912                   | 1315    | 1512     | 815                             | 912  | 1368    | 1540                          | 800      | 18121205    | 1396 686 0.4620 0.0438     |
| Tenure2 (in n of months)    | 912                   | 24762   | 41839    | 11664                           | 912  | 23319   | 33566                         | 12321    | 183923836   | 32960 12996 0.4166 0.7277  |
| CEO owns majority (dummy)   | 912                   | 0.688   | 0.464    | 1.000                           | 912  | 0.657   | 0.475                         | 1.000    | 18710.701   | 0.458 1.000 0.1627 0.8589  |
| Chm., pres.& CEO (dummy)    | 912                   | 0.349   | 0.477    | 0.000                           | 912  | 0.373   | 0.484                         | 0.000    | 18610.378   | 0.485 0.000 0.2837 0.0426  |
| GIM index                   | 912                   | 10.9102 | 712      | 11.000                          | 912  | 10.9932 | 899                           | 11.000   | 186510.5082 | 970 11.000 0.5262 0.0031   |
| Tobin's Q [-1]              | 912                   | 0.712   | 0.621    | 0.021                           | 912  | 0.585   | 0.446                         | 0.224    | 18510.527   | 0.600 0.397 1.0000 0.3867  |
| Return on Assets [-1]       | 912                   | -0.663  | 16.729   | 4.540                           | 912  | -0.222  | 15.475                        | 2.640    | 1782-0.223  | 14.721 1.940 0.9378 0.0286 |
| Return on Equity [-1]       | 912                   | -3.281  | 37.069   | 9.250                           | 912  | -0.957  | 33.187                        | 8.070    | 18041.188   | 27.783 7.675 0.4307 0.0009 |
| <b>Other firm variables</b> |                       |         |          |                                 |      |         |                               |          |             |                            |
| Total Assets (in )          | 910                   | 2428    | 6814     | 313                             | 907  | 3890    | 10570                         | 582      | 18453486    | 10531 560 0.0005 0.0016    |
| Market Capilization (in )   | 912                   | 2342    | 8355     | 489                             | 911  | 2863    | 6844                          | 396      | 18632351    | 8901 286 0.1452 0.8378     |
| Book-to-market              | 906                   | 0.511   | 0.517    | 0.380                           | 897  | 0.785   | 1.473                         | 0.475    | 17660.577   | 3.163 0.529 0.0000 0.2584  |
| Cash Flows (by capital)     | 900                   | 12.355  | 102.96   | 0.967                           | 894  | 4.863   | 25.070                        | 0.775    | 180220.067  | 461.86 0.764 0.0346 0.7066 |
| Capex to sales              | 844                   | 11.565  | 253.4190 | 0.014                           | 834  | 0.295   | 1.785                         | 0.015    | 16732.544   | 33.434 0.018 0.1992 0.076  |
| E-index                     | 912                   | 2.714   | 1.480    | 3.000                           | 912  | 2.702   | 1.503                         | 3.000    | 18652.477   | 1.593 2.000 0.8629 0.0009  |
| Instit. blockholder (dummy) | 902                   | 0.867   | 0.340    | 1.000                           | 885  | 0.806   | 0.396                         | 1.000    | 17210.787   | 0.410 1.000 0.0005 0.0001  |
| Separate Chair (dummy)      | 912                   | 0.333   | 0.472    | 0.000                           | 912  | 0.311   | 0.463                         | 0.000    | 18710.336   | 0.473 0.000 0.3166 0.8595  |

|                             | Overconfident CEOs(O)   |            |        | Predicted overconfident CEOs(P) |      |           | All non-overconfident CEOs(A) |           |      | Diff. in means |       |        |          |              |
|-----------------------------|-------------------------|------------|--------|---------------------------------|------|-----------|-------------------------------|-----------|------|----------------|-------|--------|----------|--------------|
|                             | Obs. MeanMedianStd.Dev. |            |        | Obs. MeanMedianStd.Dev.         |      |           | Obs. MeanMedianStd.Dev.       |           |      |                |       |        |          |              |
|                             | Obs.                    | Mean       | Median | Std.Dev.                        | Obs. | Mean      | Median                        | Std.Dev.  | Obs. |                | Mean  | Median | Std.Dev. | p(O-P)p(O-A) |
| Other CEO characteristics   |                         |            |        |                                 |      |           |                               |           |      |                |       |        |          |              |
| Total Compensation (in \$)  | 762                     | 2819       | 8404   | 598                             | 720  | 2754      | 8779                          | 578       | 1466 | 2605           | 7931  | 611    | 0.8842   | 0.8026       |
| Finance Education (dummy)   | 912                     | 0.202      | 0.402  | 0.000                           | 912  | 0.162     | 0.369                         | 0.000     | 1861 | 0.161          | 0.368 | 0.000  | 0.0289   | 0.0023       |
| Technical Education (dummy) | 912                     | 0.212      | 0.409  | 0.000                           | 912  | 0.145     | 0.352                         | 0.000     | 1861 | 0.110          | 0.313 | 0.000  | 0.0002   | 0.0000       |
| Depression Baby (dummy)     | 912                     | 0.038      | 0.192  | 0.000                           | 912  | 0.016     | 0.127                         | 0.000     | 1861 | 0.031          | 0.174 | 0.000  | 0.0041   | 0.4834       |
| Industries                  |                         |            |        |                                 |      |           |                               |           |      |                |       |        |          |              |
| Information Technology      | 28%                     | Utilities  | 2%     | Info.Tec.                       | 18%  | Utilities | 1%                            | Info.Tec. | 17%  | Utilities      | 1%    |        |          |              |
| Financials                  | 7%                      | Healthcare | 22%    | Fin.                            | 23%  | Health.   | 16%                           | Fin.      | 27%  | Health.        | 13%   |        |          |              |
| Consumers Discretionary     | 11%                     | Energy     | 5%     | Cons.Dis.                       | 12%  | Energy    | 6%                            | Cons.Dis. | 12%  | Energy         | 5%    |        |          |              |
| Materials                   | 8%                      | Cons. St.  | 3%     | Materials                       | 6%   | Cons.St.  | 3%                            | Materials | 6%   | Cons.St.       | 3%    |        |          |              |
| Industrials                 | 11%                     | Tel. Ser.  | 1%     | Ind.                            | 14%  | Tel.Ser.  | 1%                            | Ind.      | 15%  | Tel.Ser.       | 1%    |        |          |              |

*Notes.* The sample includes all firms in all years in which CEO overconfidence is measured. Cash compensation is salary plus bonus, CEO owns majority is a dummy variable equal to one if the CEO owns at least 50% of the company's equity, Chm., pres. & CEO is a dummy variable equal to one if the CEO is also Chairman and President of the Board. GIM index is a governance index as in Gompers et al. (2003). ROA[-1] is the company's Return on Assets at the end of the fiscal year prior to the measure of overconfidence, defined as Operating income divided by Total Assets, ROE[-1] is the company's Return on equity at the end of the fiscal year prior to the measure of overconfidence, defined as Earnings divided by Total Equity. Tobin's[-1] is the ratio of market value of assets book value of assets at the end of the fiscal year prior to the measure of overconfidence. Market Capitalization is Common Stock times the share price at the end of the fiscal year. Book-to-market is book equity over market capitalization. Cash flow is earnings before extraordinary items plus depreciation normalized by Capital at the beginning of the year. E-index is constructed as in Bechtuk et al. (2009). Institutional blockholder is a dummy variable equal to one when an institutional investors holds more than 5% of the firm's equity (as in Cremers and Nair (2005)). Total compensation is Cash compensation plus Non-Equity Incentive Plan Compensation plus All Other Compensation. Depression baby is a dummy variable equal to one if the CEO was born between 1925 and 1935 (Malmendier and Nagel, 2011). The column p(O-P) shows the p-values of the t-tests that the difference in means between Overconfident CEOs (O) and predicted overconfident CEOs (P) is zero, and p(O-A) shows the p-values of the t-tests that the difference in means between Overconfident CEOs (O) and all non-overconfident CEOs (A) is zero. \* Significant at 10%. \*\* Significant at 5%. \*\*\* Significant at 1%.

the company for long is more likely to become overconfident about future performance. This probability is also reinforced when corporate governance is weak and the CEO is the founder of the company or he simultaneously occupies the CEO and the Chairman of the board and President position. At last, positive feedback about past performance is also a good indicator about the CEO's biased beliefs since previous year's level of ROA and Tobin's Q is a significant predictor of the probability that the CEO would become overconfident.

The second step of our matching procedure is to use the predicted values from the probit regression (propensity scores) to construct the sample of nearest neighbor matched counterfactuals. Thus, for each overconfident CEO we designate, with replacement, the non-overconfident CEO with the closest propensity score, i.e., the most similar probability of becoming overconfident. Rather than characteristics, we use propensity scores as matching variables in order to reduce the dimensionality problem (Abadie and Imbens, 2007). This procedure allows us to ensure that, apart from the fact of becoming overconfident; all the CEOs in the sample have identical distributions on several characteristics that presumably affect the firm's performance. In other words, we can presume that in the absence of the overconfidence bias of the CEO, the individual and firm specific characteristics are almost identical across the two samples and we can presumably expect similar evolution of the operational and financial performance of these two groups. Table 2 presents the summary statistics of the sample of Overconfident CEOs, Predicted overconfident CEOs and All non-Overconfident CEOs. For each variable it also provides the p-values for the t-test of the hypothesis that the difference between overconfident and predicted overconfident CEOs (second to last column) and overconfident and all non-overconfident CEOs (last column) is zero. Among the variables used for the matching procedure, eight are significantly different between overconfident CEOs and all non-overconfident CEOs while none of them are significantly different between overconfident CEOs and the matched predicted overconfident CEOs. There is also no remaining significant difference in the distribution across industries in the three sub-samples.

Several additional robustness checks allow us to test the quality of the matching procedure. We perform the same sort of test of significant difference in means for 12 additional variables that are not included in the matching procedure (reported in Table 2). This allows us to check for the similarity between the treated and the control sub-samples, both on the individual CEO level and on the firm level. None of the firm related variables are significantly different between the Overconfident and the Predicted Overconfident CEOs. We also confirm the similarity of the samples along several other personal characteristics such as the CEO’s finance education, technical background and total compensation as well as a dummy variable if the CEO was born during the Great Depression (Malmendier and Nagel, 2011). In parallel, we perform a Kolmogorov-Smirnov test for equality of distribution functions between the treated and the control sample. The p-values of the null hypothesis that the distribution functions are equal for our matching variables is between 0.344 and 0.953, suggesting that the two sub-samples have similar distribution functions across all the matching variables. All these tests corroborate the choice of matching variables and confirm that our procedure identifies control individuals that are similar to the sample of overconfident CEOs.

## 4 Results

We link CEO overconfidence to three different measures of firm performance: operational performance (measured by the company’s ROA and ROE), firm value (approximated by the Tobin’s Q ratio) and stock performance (represented by the estimation of cumulative abnormal returns). In this section we present the results of all the tests and comment their implications.

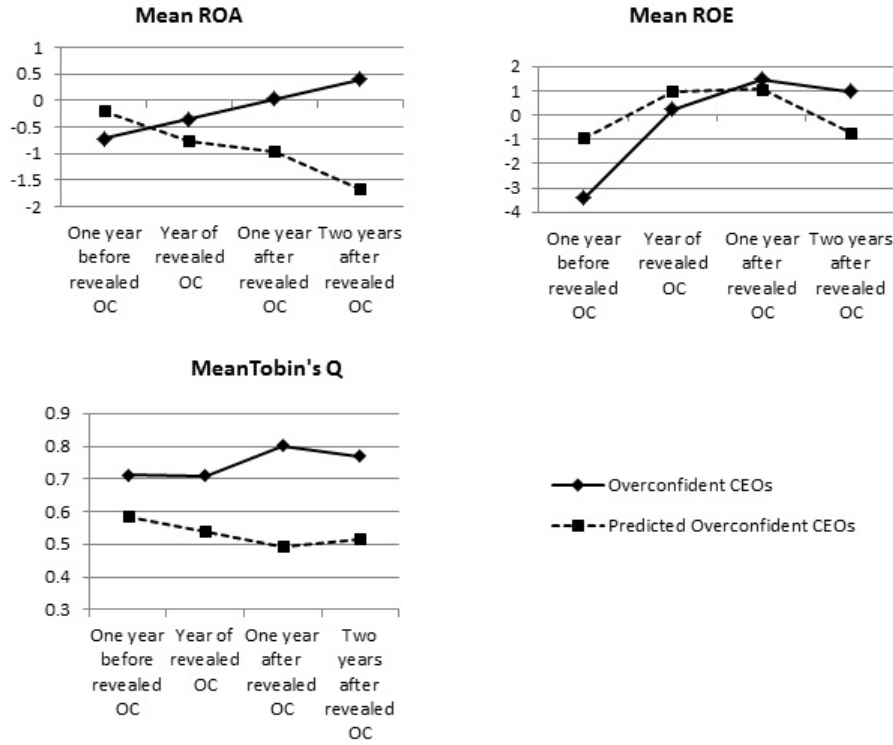
## 4.1 CEO overconfidence, Operating performance and Value of the firm

We analyze the effects of CEO overconfidence on the firm's operating performance by studying the variation of Return on Assets, the variation of Return on Equity and the variation of the value of the firm (measured by the log of the firm's Tobin's Q). We measure changes in ROA, ROE and Tobin's Q around the period when the CEO became overconfident. We call year of revealed overconfidence (T) the year when a given CEO was first identified as Overconfident based on our *HolderAboveThreshold* measure. We then retrieve data about the company's performance from the end of the fiscal year previous to the year of revealed overconfidence (T-1), the end of the fiscal year of revealed overconfidence (T) and one (T+1) and two (T+2) years after the year of revealed overconfidence. Figure 1 plots mean values of ROA, ROE and Tobin's Q for Overconfident CEOs and Predicted Overconfident CEOs for each of these periods.

The pattern of overconfident CEOs is quite different from the one of predicted overconfident CEOs. The mean value of ROA is increasing for Overconfident CEOs and decreasing for Predicted Overconfident CEOs. The mean value of Return on Equity follows similar patterns for the two sub-samples but the difference between the mean value of ROE of Predicted Overconfident CEOs and the one of Overconfident CEOs switches from positive to negative during the year that follows the period of revealed overconfidence. Likewise, we can observe an almost symmetric evolution of the log of Tobin's Q between the sample of Overconfident CEO's (whose mean firm value is increasing) and the sample of Predicted Overconfident CEOs (where the Tobin's Q ratio is decreasing over the four years).

In Table 3 we test the significance of these differences. Column 1 reports changes in ROA, ROE and Tobin's Q for Overconfident CEOs, using the last fiscal year prior to the revelation of overconfidence (T-1) as the base year. The difference in ROA for Overconfident CEOs from the base year to two years after Overconfidence is revealed is of 1.12

Figure 1: CEO Overconfidence, Operating Performance and Value of the Firm



Notes. Predicted Overconfident CEOs are chosen using nearest neighbor propensity-score matching with controls for Age, Age2, Female, MBA (dummy), Tenure (in n° of months), Cash Compensation, Founder (dummy), CEO owns majority (dummy), Chm., pres. & CEO, GIM index, ROA[-1], ROE[-1] and Tobin's Q [-1]. Year of revealed OC is the year the CEOs was identified as overconfident. ROA is Operating income divided by Total Assets, ROE is Earnings divided by Total Equity. Tobin's Q is the ratio of market value of assets over book value of assets at the end of the fiscal year. Log values of Tobin's Q are reported in order to avoid extremes-driven results.

base points (significant at the 1% level). This difference corresponds to 4.39 in the case of ROE and 5% in the case of the mean of the firm's Tobin's Q. When it comes to Predicted Overconfident CEOs the three years difference is negative both for ROA and the log of Tobin's Q, suggesting that performance got slightly poorer during the sample period for this group. The third column of Table 3 presents the difference in differences between the Overconfident and the Predicted Overconfident CEOs from one year before becoming overconfident to zero, one and two years after. The estimator is significant for all three performance measures when we look at the three year differences. Significant differences one year after the CEO became overconfident can be noticed in the case of ROA and Tobin's Q.

Generally, these results would suggest that CEO overconfidence has a positive effect

Table 3: Overconfidence, Operating Performance and Value of the Firm

|                                  | Overconfident<br>CEOs<br>average | Predicted<br>Overconfi-<br>dent CEOs<br>average | Difference<br>in aver-<br>ages | T-<br>statistics<br>of diff. in<br>averages |
|----------------------------------|----------------------------------|-------------------------------------------------|--------------------------------|---------------------------------------------|
| $\Delta\text{ROA}[-1,0]$         | 0.356<br>(0.36)                  | -0.572<br>(0.35)                                | 0.928<br>(0.55)                | 1.67                                        |
| $\Delta\text{ROA}[-1,+1]$        | 0.741<br>(0.52)                  | -0.759<br>(0.36)                                | 1.500<br>(0.68)                | 2.20**                                      |
| $\Delta\text{ROA}[-1,+2]$        | 1.112<br>(0.49)                  | -1.472<br>(0.47)                                | 2.584<br>(0.79)                | 3.28***                                     |
| $\Delta\text{ROE}[-1,0]$         | 3.657<br>(1.24)                  | 1.917<br>(1.24)                                 | 1.741<br>(2.07)                | 0.84                                        |
| $\Delta\text{ROE}[-1,+1]$        | 4.913<br>(1.29)                  | 1.991<br>(1.25)                                 | 2.922<br>(2.23)                | 1.31                                        |
| $\Delta\text{ROE}[-1,+2]$        | 4.393<br>(1.35)                  | 0.198<br>(1.20)                                 | 4.195<br>(2.20)                | 1.90***                                     |
| $\Delta\text{Tobin's Q} [-1,0]$  | -0.001<br>(0.02)                 | -0.044<br>(0.01)                                | 0.043<br>(0.02)                | 1.78**                                      |
| $\Delta\text{Tobins'Q} [-1,+1]$  | 0.089<br>(0.03)                  | -0.092<br>(0.02)                                | 0.181<br>(0.05)                | 3.56***                                     |
| $\Delta\text{Tobin's Q} [-1,+2]$ | 0.057<br>(0.03)                  | -0.068<br>(0.03)                                | 0.125<br>(0.06)                | 1.97*                                       |

*Notes.*  $\Delta$  indicates difference between the end of the fiscal year before Overconfidence was revealed and the horizon of years after overconfidence was revealed shown in brackets. ROA is Operating income divided by Total Assets; ROE is Earnings divided by Total Equity. Tobin's Q is the ratio of market value of assets over book value of assets at the end of the fiscal year. Log values of Tobin's Q are reported in order to avoid extremes-driven results. Predicted Overconfident CEOs are chosen using nearest neighbor propensity-score matching with controls for Age, Age2, Female, MBA (dummy), Tenure (in n° of months), Cash Compensation, Founder (dummy), CEO owns majority (dummy), Chm., pres. & CEO, GIM index, ROA[-1], ROE[-1] and Tobin's Q [-1]. The last column reports t-statistics for the difference-in-differences estimators. Absolute values of standard errors are in parentheses. \* Significant at 10%. \*\* Significant at 5%. \*\*\* Significant at 1%.

on the firm's operating performance and value. However, this effect is not immediate (the difference between the evolution of performance of firms in the group of overconfident CEOs and Predicted Overconfident CEOs is weakly significant during the year of revealed overconfidence). Later on, firms whose CEO became overconfident outperform firms whose CEOs were as likely to become overconfident but did not. Hence, overconfidence alone can significantly affect the variation of firms' operational performance in time.

Table 4: CEO Overconfidence and Stock Market Performance

|                | Overconfident<br>CEOs<br>average | Predicted<br>overconfi-<br>dent CEOs<br>average | Difference<br>in aver-<br>ages | T-<br>statistics<br>of diff. in<br>averages |
|----------------|----------------------------------|-------------------------------------------------|--------------------------------|---------------------------------------------|
| CAR (0, 250)   | 1.318<br>(0.07)                  | 0.527<br>(0.08)                                 | 0.791<br>(0.14)                | 5.66***                                     |
| CAR (0, 500)   | 3.923<br>(0.15)                  | 2.500<br>(0.18)                                 | 1.422<br>(0.32)                | 4.49***                                     |
| CAR (0, 750)   | 6.202<br>(0.18)                  | 5.287<br>(0.21)                                 | 0.915<br>(0.36)                | 2.51*                                       |
| CAR (125, 375) | 1.679<br>(0.07)                  | 1.267<br>(0.09)                                 | 0.412<br>(0.15)                | 2.70**                                      |
| CAR (125, 625) | 4.169<br>(0.13)                  | 3.639<br>(0.16)                                 | 0.530<br>(0.27)                | 1.97*                                       |
| CAR (125, 875) | 8.451<br>(0.19)                  | 7.255<br>(0.26)                                 | 1.196<br>(0.44)                | 2.70***                                     |
| CAR (250, 500) | 2.082<br>(0.08)                  | 1.679<br>(0.09)                                 | 0.403<br>(0.16)                | 2.45**                                      |
| CAR (250, 750) | 4.830<br>(0.13)                  | 4.752<br>(0.15)                                 | 0.077<br>(0.26)                | 0.29                                        |
| CAR (250, 900) | 7.623<br>(0.16)                  | 7.208<br>(0.21)                                 | 0.415<br>(0.34)                | 1.22                                        |

*Notes.* Predicted Overconfident CEOs are chosen using nearest neighbor propensity-score matching with controls for Age, Age2, Female, MBA (dummy), Tenure (in n° of months), Cash Compensation, Founder (dummy), CEO owns majority (dummy), Chm., pres. & CEO, GIM index, ROA[-1], ROE[-1] and Tobin's Q [-1]. Event windows are in trading days with 0 as the first trading day of the year the CEO overconfidence was revealed. Expected returns are calculated using a market model with the CRSP value weighted index as a proxy for market returns. Each alpha and beta values are estimated by a 2 years estimation period ending at date 0. The last column reports t-statistics for the difference-in- average CAR estimators. Absolute value of standard errors in parentheses. \* Significant at 10%. \*\* Significant at 5%. \*\*\* Significant at 1%.

## 4.2 CEO Overconfidence and market returns

The next step towards understanding the effect of overconfidence on corporate performance consists in measuring the stock market reaction to CEO overconfidence. We compute the cumulative abnormal returns after the moment the CEO becomes overconfident using a market model with the CRSP value weighted index as a proxy for market returns. We estimate  $\alpha$  and  $\beta$  using three years daily returns ending at the end of the fiscal year before the CEO became overconfident. Because we cannot measure precisely the time at which shareholders become aware of CEO overconfidence we construct the

event windows starting from three different dates: (i) the beginning of the year when CEO overconfidence was revealed (day 0); (ii) the 1st of July of the year when CEO overconfidence was revealed (day 125); (iii) the end of the year CEO overconfidence was revealed (day 250). We then look at the cumulative abnormal returns starting from each specific date and until one year (250 days); two years (500 days) and three years (750 days) after. Table 4 provides results about the average CAR of each event window for Overconfident and Predicted overconfident CEOs (column 1 and 2) and the cross sample difference between averages (column 3).

There is a positive difference between the average cumulative abnormal returns of overconfident CEOs versus the one of Predicted overconfident CEOs. This difference is stronger when we include in our analysis the entire year during which the CEO was first identified as overconfident (starting from day 0) suggesting that the stock market impact of CEO overconfidence is presumably quite prompt. This would imply two important ideas: not only do investors positively react to CEO overconfidence but they seem to notice and integrate it in the company’s valuation quite quickly.

Furthermore, the effect of CEO overconfidence on stock performance seems long-lasting (remains significant even two years after the revelation of overconfidence) even though it fades as we go further from the time the CEO was first identified as overconfident.

We perform an additional analysis of the stock market consequences of CEO overconfidence by constructing a zero-investment value weighted portfolio of overconfident CEOs and of non-overconfident CEOs. The portfolios are constructed in the following way. We run a new propensity score matching procedure between firms whose CEO became overconfident during the sample period and those whose CEO remained realistic during the entire sample period. In other words we restrict our sample to one period of four years and use a new, time-invariant dummy variable *HolderAboveThresholdTIV* that equals one if the CEO was revealed as overconfident at any time between 2006 and 2010 and 0 if

not. Then we run a probit regression that measures the probability that a CEO would become overconfident during the 5 sample years (see Table 5). We use the results of this regression to construct the control sub-sample of Predicted Overconfident CEOs. This strategy allows us to have a sample of 278 overconfident CEOs and a control sample of 278 Predicted Overconfident CEOs who were equally likely but did not reveal overconfidence during the entire sample period.

Table 5: Determinants of Overconfidence  
(Time Invariant Analysis)

|                           | Odds-ratios | Std. Errors |
|---------------------------|-------------|-------------|
| Age                       | -0.0775     | (0.065)***  |
| Age2                      | 0.0005      | (0.001)**   |
| Female                    | -0.2937     | (0.262)     |
| MBA (dummy)               | 0.3501      | (0.118)***  |
| Tenure (in n° of months)  | 0.0000      | (0.000)***  |
| Cash Compensation         | 0.0000      | (0.000)***  |
| Founder (dummy)           | 0.2403      | (0.107)**   |
| CEO owns majority (dummy) | 0.0097      | (0.131)     |
| Chm., pres. & CEO         | -0.0419     | (0.103)     |
| GIM index                 | 0.0372      | (0.018)**   |
| ROA                       | 0.0002      | (0.001)     |
| ROE                       | 0.0000      | (0.000)     |
| Tobins' Q                 | -0.0008     | (0.002)     |
| Pseudo R2                 |             | 0.0457      |
| Observations              |             | 690         |

*Notes.* The sample includes all firms in each year for the period from 2006 to 2010. The dependent variable is a dummy variable (HolderAboveThresholdTIV) equal to one when a CEO has been identified as overconfident at least once during the entire sample period i.e he twice failed to exercise a stock option package that was above the year's threshold level. Cash compensation is salary plus bonus, CEO owns majority is a dummy variable equal to one if the CEO owns at least 50% of the company's equity, Chm., pres. & CEO is a dummy variable equal to one if the CEO is also Chairman and President of the Board. GIM index is a governance index as in Gompers et al. (2003). ROA[-1] is the company's Return on Assets at the end of 2005, defined as Operating income divided by Total Assets, ROE[-1] is the company's Return on equity at the end of 2005, defined as Earnings divided by Total Equity. Tobin's Q [-1] is the ratio of market value of assets book value of assets at the end of 2005. \* Significant at 10%. \*\* Significant at 5%. \*\*\* Significant at 1%.

Based on this distinction we construct 3 different value weighted portfolios. A portfolio of only overconfident CEOs, a portfolio of only Predicted Overconfident CEOs and a zero-investment strategy portfolio that buys the Overconfident CEOs stocks and sells short the Predicted overconfident CEOs stocks (for more details about this methodology see Gompers et al. (2003)). We run a time series regression of the value weighted average

portfolios returns on the value-weighted market returns minus the risk free rate (RMRF) and the terms: SMB (small minus big), HML (high minus low) and Momentum which are the daily returns on a zero-investment factor-mimicking portfolio designed to capture size, book-to-market, and momentum effects.

Table 6 reports the results of the regression for the period between 2006 and 2010 (1260 trading days). The first column reports the estimations of the value-weighted portfolio of firms with overconfident CEOs whereas the second column reports results about the value-weighted portfolio of firms with Predicted overconfident CEOs. In the last column we report the results of estimating the four factors model where the dependent variable is the monthly return difference between the Overconfident CEOs portfolio and the Predicted Overconfident CEOs portfolio. We view the four factor model here as a method of performance measurement and interpret the estimated intercept coefficient "alpha" as the abnormal return in excess of what could have been earned by investing in the factors. The portfolio of "Overconfident - Predicted Overconfident CEOs" has a positive alpha value of roughly 25 basis points per month suggesting that firms with Predicted Overconfident CEOs underperform compared to firms with Overconfident CEOs. The results also show that the alpha is higher for a portfolio composed only by firms whose CEO revealed overconfidence during the sample period relative to a portfolio of firms whose CEOs remained realistic during the entire sample period.

Long-run stock market out-performance of firms with Overconfident CEOs is challenging to interpret. Whether investors misinterpret the CEOs positive forecasts and are persuaded by his positive attitude or they anticipate positive effect of the CEOs confidence regardless of the accuracy of his estimation is an open question. However, our results provide a meaningful insight to the debate concerning the market's reaction to CEOs who noticeably make overconfident forecasts of the firm's future.

Table 6: Long-run returns to different portfolios

|       | Value-weighted<br>portfolio of<br>firms with<br>OC CEOs | Value-weighted<br>portfolio of<br>firms with<br>Predicted<br>OC CEOs | Firms with<br>OC CEOs -<br>Firms with<br>Predicted OC<br>CEOs value-weighted<br>portfolio |
|-------|---------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Alpha | 0.060<br>(0.01)***                                      | 0.040<br>(0.02)***                                                   | 0.025<br>(0.02)                                                                           |
| RMRF  | 1.110<br>(0.01)***                                      | 1.117<br>(0.02)***                                                   | -0.014<br>(0.02)                                                                          |
| SMB   | 0.205<br>(0.02)***                                      | 0.168<br>(0.03)***                                                   | 0.039<br>(0.03)***                                                                        |
| HML   | -0.309<br>(0.02)***                                     | 0.021<br>(0.03)                                                      | -0.319<br>(0.03)                                                                          |
| UMD   | 0.014<br>(0.01)                                         | -0.018<br>(0.02)                                                     | 0.033<br>(0.01)*                                                                          |
| Obs.  | 1222                                                    | 1220                                                                 | 1210                                                                                      |
| R2    | 0.909                                                   | 0.883                                                                | 0.139                                                                                     |

*Notes.* Predicted Overconfident CEOs are chosen using cross-section nearest neighbor propensity-score matching with controls for Age, Age2, Female, MBA (dummy), Tenure (in n° of months), Cash Compensation, Founder (dummy), CEO owns majority (dummy), Chm., pres. & CEO, GIM index, ROA, ROE and Tobin's Q. The sample of overconfident CEOs and the one of predicted overconfident CEOs contains 278 individual observations each. The third column reports the results for the value weighted daily return of the portfolio that is long in firms with overconfident CEOs and short in firms with predicted overconfident CEOs. Alpha is the alpha from a four-factor model with the returns from a zero investment portfolio capturing market(RMRF),size(SMB),book-to-market(HML)and momentum (UMD)(see Carhart (1997) and Fama and French (1993) on the construction of these factors. The sample period is from the 3rd of January 2006 to the 31st of December 2010 (i.e., 1260 trading days). Absolute value of t-statistics in parentheses. \* Significant at 10%.\*\* Significant at 5%. \*\*\* Significant at 1%.

## 5 The interaction effect of CEO Overconfidence and Corporate Governance

Thus far our results suggest that CEO overconfidence generally improves corporate performance. Furthermore, we argue that this bias is more likely to occur among powerful CEOs, i.e., in firms where corporate governance weakly assures the protection of shareholders. Alongside, strong corporate governance has been shown to assure better financial performance (higher stock market returns) and an increase in the value of the firm (Bebchuk et al., 2009; Gompers et al., 2003).

Hence the next question of our analysis consists in looking at the joint effect of CEO overconfidence and corporate governance. In essence, along with incentivizing executives to work in the interest of shareholders, corporate governance mechanisms might groom the manager of the firm and prevent the emergence of overconfidence and other sorts of bias. In firms where corporate governance is strong, the CEO would be more conditioned to rationalizing and conservative decision making. However, eventually this increased discipline might lead to a lack of creativity and executive narrow-mindedness that would end up harming the interests of shareholders. This idea is strongly related to a larger debate in the corporate governance literature opposing two approaches of the relationship between management and shareholders, one of *control*, based on agency theory and one of *collaboration* building on notions from sociology and psychology. Surprisingly though the idea of the joint effects of a given firm's quality of corporate governance and the psychological profile of its CEO has been quite scarcely explored and even less empirically addressed. Some recent empirical articles have argued that corporate governance can presumably "kill" the leader's performance destroying traits or tendencies such as overconfidence (Banerjee et al., 2013). Others suggest that good corporate governance would allow a better monitoring and thus a more frequent replacement of extremely confident (optimistic) leaders (Campbell et al., 2011). The basic postulate of this literature is that executives overconfidence is value reducing and it is the role of corporate governance to "rationalize" the overconfident CEO whose biased predictions harm performance. This is however a questionable hypothesis since as previously shown the effects of overconfident beliefs on the CEO's behavior might be valuable for shareholders. In such a case, reinforcing corporate governance in order to prevent the development of overconfident beliefs eventually reveals as an adverse strategy.

Several theoretical models have however defended the idea of CEO overconfidence as a belief that would lead to a reduction of the conflict of interest between executives and shareholders. Gervais et al. (2011) set forth the incentivizing effect of overconfidence when it comes to risky projects while De la Rosa (2011) study the motivational consequences of

Table 7: Performance of Overconfident CEOs by quality of corporate governance

|                           | Strong<br>governance<br>(GIM<10) | (10≤GIM<12)                | Weak<br>governance<br>(GIM≥ 12) |
|---------------------------|----------------------------------|----------------------------|---------------------------------|
| ΔROA[-1,+2]               | 0.243<br>(1.74)<br>N=554         | 0.627<br>(0.91)<br>N=599   | 4.470<br>(1.41)**<br>N=844      |
| ΔROE[-1,+2]               | 3.217<br>(4.76)<br>N=536         | 4.836<br>(3.42)<br>N=596   | 5.023<br>(5.02)<br>N=867        |
| Δlog of Tobin's Q [-1,+2] | 0.121<br>(0.13)<br>N=555         | -0.056<br>(3.25)<br>N=592  | 0.283<br>(0.09)**<br>N=857      |
| CAR (0, 250)              | 0.687<br>(0.29)**<br>N=582       | 0.634<br>(0.26)**<br>N=592 | 0.777<br>(0.24)***<br>N=841     |
| CAR (125, 375)            | 0.628<br>(0.29)*<br>N=583        | 0.279<br>(0.28)<br>N=593   | 0.726<br>(0.26)***<br>N=841     |
| CAR (250, 500)            | 0.377<br>(0.31)<br>N=579         | 0.097<br>(0.30)<br>N=594   | 0.460<br>(0.28)<br>N=841        |

*Notes.* GIM is the governance index of Gompers et al. (2003) . The 33rd and 66th percentiles of the distribution of the index among the firms in the sample (a GIM equal to ten and twelve respectively) are used to split the sample in three subgroups with different corporate governance quality. Predicted Overconfident CEOs are chosen using nearest neighbor propensity-score matching for each subgroup with controls for Age, Age2, Female, MBA (dummy), Tenure (in n of months), Cash Compensation, Founder (dummy), CEO owns majority (dummy), Chm., pres. & CEO, ROA[-1], ROE[-1] and Tobin's Q [-1]. Δ indicates difference between the end of the fiscal year before Overconfidence was revealed and the horizon of years after overconfidence is revealed shown in brackets. ROA is Operating income divided by Total Assets; ROE is Earnings divided by Total Equity. Tobin's Q is the ratio of market value of assets over book value of assets at the end of the fiscal year. Log values of Tobin's Q are reported in order to avoid extremes-driven results. Expected returns are calculated using a market model with the CRSP value weighted index as a proxy for market returns. Each firm's alpha and beta values are estimated by a 2 years estimation period ending at date 0. Event windows are in trading days with 0 as the first trading day of the year the CEO overconfidence was revealed. N is the total number of CEOs in each category. Absolute value of standard errors in parentheses. \* Significant at 10%. \*\* Significant at 5%. \*\*\* Significant at 1%.

overconfidence that would guarantee the CEO implication and reduce the need of costly incentivizing remuneration, thus limiting the moral hazard problem. Building on this literature, we study the joint effect of CEO overconfidence and corporate governance, as two interrelated ways of aligning management and shareholders aspirations. As previously, we use the 24-items GIM index of Gompers et al. (2003) to measure the strength of corporate governance. As mentioned, a higher value of this index implies weaker shareholders rights. We take the 33<sup>rd</sup> percentile (corresponding to 10) and the 66<sup>th</sup> percentile (corresponding to 12) of the distribution of this index among firms in our sample, and use these values to separate the sample in three groups. Then we redo the entire analysis of the previous sections, by matching separately overconfident CEOs to their similar counterfactuals for each category of corporate governance. Unlike previously, we do not include corporate governance as a dependent variable in this new propensity score matching procedure since firms within each group all have similar levels of corporate governance.

Table 7 presents the results for firms with strong corporate governance ( $GIM < 10$ ), firms with intermediate level of corporate governance ( $10 \leq GIM < 12$ ) and firms with weak corporate governance ( $GIM \geq 12$ ). For brevity, we only expose results about long term operating performance and value of the firm (2 years after revealed overconfidence) as they were the most significant ones in the previous sections. Similarly, we only use one year cumulative abnormal returns for the analysis of the stock market performance.

The results of Table 7 indicate that the effect of overconfidence on corporate performance is not only more significant but also stronger for firms with poor corporate governance. We find that operational outperformance of firms with overconfident CEOs is only significant for firms with higher managerial protection ( $GIM \geq 12$ ). Additionally, we confirm a significant difference in CARs between firms with overconfident CEOs and those with predicted overconfident CEOs. This difference increases in the last subsample reflecting a reinforcement of the positive effect of overconfidence when corporate governance is weak.

By this we support the idea that CEO overconfidence and Corporate Governance can be seen as substitutes. In other words, monitoring the CEO and framing his decisions would be less necessary when he has been identified as overconfident. Our results are also in line with the literature suggesting that corporate governance mechanisms reduce the effect of CEO overconfidence on performance (Banerjee et al., 2013). However, unlike this literature, in our framework this moderating role of corporate governance is not favored since CEO overconfidence is a performance enhancing factor.

## 6 Discussion and conclusion

The main message of this paper is that CEO overconfidence is an endogenously generated, nurtured belief that cannot be seen independently from firm specifics and executives' personal background. Whether overconfident beliefs are related to the working environment (strong power, weak corporate governance, positive past feedback) or to individual experiences (tenure, past performance, self-image), the fact that a CEO would reveal overconfident beliefs at a precise moment during his tenure in a given company is completely contingent to the corporate and professional context. This idea holds even if we admit that overconfidence is an innate quality. In such a case, it is the complexity of the CEO recruitment process, the choice of a CEO by a given firm or the self-selection of CEOs when applying for a specific position that would assure that the coupling between CEOs and firms is not random. In turn, the performance of these CEOs as managers of their firms is undeniably interfered by selection bias.

We explored the operating and stock performance of firms with overconfident CEOs alleviating the selection bias issue through the construction of a control sample that only differed from the basic sample on the fact that these firms' CEOs, although with similar premises for the development of overconfidence remained realistic during a given sample year.

The results of this analysis have multiple implications. First, we show a positive effect of overconfidence on corporate performance. The evolution of the mean level of ROA and ROE of firms two years after their CEO became overconfident is significantly higher than the evolution of similar firms with realistic CEOs. This is also confirmed when we analyze the variation of firms' mean Tobin's Q as a proxy for the value of the firm. Moreover, investors seem to be aware of this positive effect of overconfidence on performance as they integrate CEO overconfidence in their valuation of the company's equity. In turn, firms with overconfident CEOs have higher cumulative abnormal returns than their counterparts. The analysis of the portfolios of firms with overconfident CEOs and the portfolios of those with realistic CEOs during the period from 2006 to 2010 confirmed these results suggesting a significant outperformance of firms managed by overconfident CEOs.

The consistency between the effects of CEO overconfidence on operational and market performance would imply that investors rightfully react to CEO overconfidence. However, whether this positive reaction is related to the anticipation of improved future operational performance due to the benefits of the overconfidence bias such as risk taking, higher motivation stronger persuasiveness and better leadership or it is the effect of the capacity of the CEO to convince investors that his forecasts are accurate and thus the stock is undervalued, remains an open question. In other words, our analysis does not allow discriminating whether the investors' reaction to overconfidence is driven by their belief that the CEO has better information and thus his (biased) forecasts are seen as accurate or by their belief that the demonstration of overconfidence by the CEO would lead to better performance in the future.

Beyond suggesting that firms with overconfident CEOs perform better than firms without overconfident CEOs, our results carry the question of the performance of firms that allow the emergence of overconfidence (through governance, power allocation or recruitment choices) compared to firms that prevent the emergence of CEO overconfidence. Several important concerns such as the process of CEO selection and the quality of the

firm's corporate governance are directly related to this idea. For example we have shown that weak corporate governance is a good predictor of the probability that the firm's CEO will form overconfident beliefs. Overconfidence, on the other hand, seems to assure better future performance the same way good corporate governance has been widely demonstrated as a performance enhancing mechanism. In this line of thought, rather than seeing governance mechanisms as ways of disciplining the CEO and limiting the losses related to his overconfident decision making, we suggest an alternative sight. We argue that firms with weak corporate governance adapt through the influence that the powerful and uncontested position of the CEO would have on his beliefs and behavior. This latest would thus behave in the interest of shareholders not because of rules and incentives but because of his core beliefs. Of course, this idea and the results that support it are so far in a merely exploratory phase and need more thorough testing and analysis. Nevertheless, the results of this study globally defend the postulate according to which overconfidence among corporate leaders is not only endogenously provoked but it can also be a part of a given internal corporate equilibrium assuring long term performance and stability.

## References

- Abadie, A. and Imbens, G. W. (2007). Bias corrected matching estimators for average treatment effects. *Unpublished manuscript*.
- Ahmed, A. S. and Duellman, S. (2013). Managerial overconfidence and accounting conservatism. *Journal of Accounting Research*, 51(1):1–30.
- Anderson, C. and Galinsky, A. D. (2006). Power, optimism, and risk-taking. *European Journal of Social Psychology*, 36(4):511–536.
- Baker, M., Ruback, R. S., and Wurgler, J. (2004). Behavioral corporate finance: A survey. Technical report, National Bureau of Economic Research.
- Banerjee, S., Humphery-Jenner, M., and Nanda, V. (2013). Restraining overconfident CEOs. *Unpublished manuscript*.
- Bebchuk, L., Cohen, A., and Ferrell, A. (2009). What matters in corporate governance? *Review of Financial Studies*, 22(2):783–827.
- Ben-David, I., Graham, J. R., and Harvey, C. R. (2007). Managerial overconfidence and corporate policies. Technical report, National Bureau of Economic Research.
- Billett, M. T. and Qian, Y. (2008). Are overconfident CEOs born or made? evidence of self-attribution bias from frequent acquirers. *Management Science*, 54(6):1037–1051.
- Busenitz, L. W. (1999). Entrepreneurial risk and strategic decision making. It’s a matter of perspective. *The Journal of Applied Behavioral Science*, 35(3):325–340.
- Campbell, T. C., Gallmeyer, M., Johnson, S. A., Rutherford, J., and Stanley, B. W. (2011). CEO optimism and forced turnover. *Journal of Financial Economics*, 101(3):695–712.
- Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of Finance*, 52(1):57–82.

- Cesarini, D., Lichtenstein, P., Johannesson, M., and Wallace, B. (2009). Heritability of overconfidence. *Journal of the European Economic Association*, 7(2-3):617–627.
- Chen, Q. and Jiang, W. (2006). Analysts’ weighting of private and public information. *Review of Financial Studies*, 19(1):319–355.
- Cooper, A. C., Woo, C. Y., and Dunkelberg, W. C. (1988). Entrepreneurs’ perceived chances for success. *Journal of Business Venturing*, 3(2):97–108.
- Cremers, K. and Nair, V. B. (2005). Governance mechanisms and equity prices. *The Journal of Finance*, 60(6):2859–2894.
- Daniel, K., Hirshleifer, D., and Subrahmanyam, A. (1998). Investor psychology and security market under-and overreactions. *The Journal of Finance*, 53(6):1839–1885.
- De la Rosa, L. E. (2011). Overconfidence and moral hazard. *Games and Economic Behavior*, 73(2):429–451.
- Fama, E. F. and French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1):3–56.
- Fast, N. J., Sivanathan, N., Mayer, N. D., and Galinsky, A. D. (2012). Power and overconfident decision-making. *Organizational Behavior and Human Decision Processes*, 117(2):249–260.
- Galasso, A. and Simcoe, T. S. (2011). CEO overconfidence and innovation. *Management Science*, 57(8):1469–1484.
- Gervais, S., Heaton, J., and Odean, T. (2011). Overconfidence, compensation contracts, and capital budgeting. *The Journal of Finance*, 66(5):1735–1777.
- Gervais, S. and Odean, T. (2001). Learning to be overconfident. *Review of Financial Studies*, 14(1):1–27.
- Gilovich, T., Griffin, D., and Kahneman, D. (2002). *Heuristics and biases: The psychology of intuitive judgment*. Cambridge University Press.

- Goel, A. M. and Thakor, A. V. (2008). Overconfidence, CEO selection, and corporate governance. *The Journal of Finance*, 63(6):2737–2784.
- Gompers, P., Ishii, J., and Metrick, A. (2003). Corporate governance and equity prices. *The Quarterly Journal of Economics*, 118(1):107–156.
- Griffin, D. W. and Varey, C. A. (1996). Towards a consensus on overconfidence. *Organizational Behavior and Human Decision Processes*, 65(3):227–231.
- Hall, B. J. and Murphy, K. J. (2002). Stock options for undiversified executives. *Journal of Accounting and Economics*, 33(1):3–42.
- Hayward, M. L. and Hambrick, D. C. (1997). Explaining the premiums paid for large acquisitions: Evidence of CEO hubris. *Administrative Science Quarterly*, pages 103–127.
- Hilary, G. and Menzly, L. (2006). Does past success lead analysts to become overconfident? *Management Science*, 52(4):489–500.
- Hiller, N. J. and Hambrick, D. C. (2005). Conceptualizing executive hubris: the role of (hyper-) core self-evaluations in strategic decision-making. *Strategic Management Journal*, 26(4):297–319.
- Kahneman, D. and Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society*, pages 263–291.
- Keltner, D., Gruenfeld, D. H., and Anderson, C. (2003). Power, approach, and inhibition. *Psychological Review*, 110(2):265.
- Khurana, R. (2002). *Searching for a corporate savior: The irrational quest for charismatic CEOs*. Princeton University Press.
- Klayman, J., Soll, J. B., González-Vallejo, C., and Barlas, S. (1999). Overconfidence: It depends on how, what, and whom you ask. *Organizational Behavior and Human Decision Processes*, 79(3):216–247.

- Langer, E. J. (1975). The illusion of control. *Journal of Personality and Social Psychology*, 32(2):311.
- Malmendier, U. and Nagel, S. (2011). Depression babies: Do macroeconomic experiences affect risk taking? *The Quarterly Journal of Economics*, 126(1):373–416.
- Malmendier, U. and Tate, G. (2005). CEO overconfidence and corporate investment. *The Journal of Finance*, 60(6):2661–2700.
- Malmendier, U. and Tate, G. (2008). Who makes acquisitions? CEO overconfidence and the market’s reaction. *Journal of Financial Economics*, 89(1):20–43.
- Malmendier, U. and Tate, G. (2009). Superstar CEOs. *The Quarterly Journal of Economics*, 124(4):1593–1638.
- Paredes, T. (2004). Too much pay, too much deference: Is CEO overconfidence the product of corporate governance. *Unpublished working paper, Washington University School of Law*.
- Radzevick, J. R. and Moore, D. A. (2011). Competing to be certain (but wrong): Market dynamics and excessive confidence in judgment. *Management Science*, 57(1):93–106.
- Rosenbaum, P. R. and Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1):41–55.
- Trivers, R. (2000). The elements of a scientific theory of self-deception. *Annals of the New York Academy of Sciences*, 907(1):114–131.
- Zarnoth, P. and Snizek, J. A. (1997). The social influence of confidence in group decision making. *Journal of Experimental Social Psychology*, 33(4):345–366.

# Appendix

## A. Description of variables

Table A.1: List of variables

| Variable name             | Description                                                                                                                  |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Founder                   | Dummy variable, equals 1 if the CEO was the founder of the company                                                           |
| Female                    | Dummy variable, equals 1 if the CEO is a woman                                                                               |
| MBA                       | Dummy variable, equals 1 if the CEO has an MBA degree                                                                        |
| Age                       | CEO's age                                                                                                                    |
| Age2                      | CEO's square age                                                                                                             |
| Cash Compensation         | Annual Salary plus Bonus plus Non-Equity Incentive Plan and All Other Cash Compensation (in K\$)                             |
| Tenure                    | Number of months the CEO spent on the CEO position                                                                           |
| CEO owns majority         | Dummy variable, equals 1 if the CEO owns the majority of the company's shares                                                |
| Chm., pres.& CEO          | Dummy variable, equals 1 if the CEO is the Chairman and the President of the Board                                           |
| GIM index                 | A 24-items corporate governance index                                                                                        |
| Tobin's Q                 | The ratio of market value of assets over book value of assets at the of the fiscal year                                      |
| Return on Assets          | The ratio of Operating income over Total Assets                                                                              |
| Return on Equity          | The ratio of Earnings divided by Total Equity                                                                                |
| Total Assets              | Total value of assets at the end of the fiscal year (in K\$)                                                                 |
| Market Capitalization     | Market Capitalization is Common Stock times the share price at the end of the fiscal year (in K\$)                           |
| Book-to-market            | Book equity over market capitalization.                                                                                      |
| Cash Flows (by capital)   | Cash flow is earnings before extraordinary items plus depreciation normalized by capital                                     |
| Capex to sales            | Ratio of Capital expenditures over Sales at the end of the fiscal year                                                       |
| E-index                   | A 6-items corporate governance(entrenchment) index                                                                           |
| Institutional blockholder | Dummy variable, equals 1 if there is an institutional shareholder who owns more than 5% of the firm's equity                 |
| Separate Chair            | Dummy variable, equals 1 if there is a corporate rule to separate the CEO and the President of the Board function            |
| Total Compensation        | Cash Compensation plus Stock Awards Value plus All Other Incentive compensation (in K\$ )                                    |
| Finance Education         | Dummy variable, equals 1 if the CEO's college major was in Finance                                                           |
| Technical Education       | Dummy variable, equals 1 if the CEO's college major was in Engineering                                                       |
| Depression Baby           | Dummy variable, equals 1 if the CEO was born between 1925 and 1935                                                           |
| CAR                       | Cumulative abnormal returns computed by comparing realized returns to expected returns as estimated with the 4-factors model |

Table A.2: Correlation matrix

|                         | <u>1</u>  | <u>2</u>  | <u>3</u>  | <u>4</u>  | <u>5</u>  | <u>6</u>  | <u>7</u>  | <u>8</u>  | <u>9</u>  | <u>10</u> | <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1. HAT                  | 1.00      |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 2. Founder              | 0.07*     | 1.00      |           |           |           |           |           |           |           |           |           |           |           |           |
| 3. Female               | -0.04     | 0.00      | 1.00      |           |           |           |           |           |           |           |           |           |           |           |
| 4. MBA                  | 0.13*     | 0.00      | -0.02     | 1.00      |           |           |           |           |           |           |           |           |           |           |
| 5. Age                  | -0.12*    | -0.09*    | 0.01      | -0.03     | 1.00      |           |           |           |           |           |           |           |           |           |
| 6. Age2                 | -0.12*    | -0.08*    | 0.01      | -0.03     | 0.99*     | 1.00      |           |           |           |           |           |           |           |           |
| 7. Cash Compensation    | 0.06*     | -0.05     | -0.05*    | 0.13*     | 0.08*     | 0.07*     | 1.00      |           |           |           |           |           |           |           |
| 8. Tenure               | -0.02     | 0.13*     | 0.09*     | -0.03     | 0.32*     | 0.33*     | 0.07*     | 1.00      |           |           |           |           |           |           |
| 9. CEO owns majority    | -0.05     | 0.19*     | -0.01     | -0.09*    | 0.14*     | 0.16*     | -0.08*    | 0.29*     | 1.00      |           |           |           |           |           |
| 10. Chm., pres.& CEO    | -0.04     | 0.01      | 0.00      | 0.05*     | 0.07*     | 0.07*     | 0.07*     | 0.03      | 0.14*     | 1.00      |           |           |           |           |
| 11. GIM index           | 0.09*     | -0.01     | 0.01      | 0.03      | -0.02     | -0.03     | 0.08*     | -0.07*    | -0.17*    | 0.00      | 1.00      |           |           |           |
| 12. Total Assets        | -0.05*    | 0.03      | -0.05     | 0.17*     | 0.04      | 0.03      | 0.33*     | 0.01      | -0.09*    | 0.00      | -0.01     | 1.00      |           |           |
| 13. Market Cap.         | 0.03      | 0.04      | -0.04     | 0.09*     | 0.05      | 0.04      | 0.45*     | 0.04      | -0.05     | -0.06*    | -0.03     | 0.52*     | 1.00      |           |
| 14. Book-to-market      | -0.01     | -0.08*    | 0.00      | 0.02      | 0.02      | 0.02      | 0.01      | -0.01     | -0.02     | -0.03     | 0.09*     | 0.04      | -0.01     | 1.00      |
| 15. Cash Flows by K     | -0.01     | 0.05      | -0.01     | -0.02     | -0.06*    | -0.05*    | -0.06*    | -0.01     | 0.00      | 0.02      | -0.02     | -0.01     | -0.01     | -0.02     |
| 16. Capex to sales      | 0.03      | 0.03      | -0.01     | -0.02     | 0.01      | 0.01      | -0.03     | -0.02     | 0.00      | -0.02     | -0.02     | -0.01     | -0.01     | -0.02     |
| 17. E-index             | 0.08*     | -0.01     | -0.02     | 0.06*     | -0.01     | -0.01     | 0.05*     | -0.03     | -0.17*    | 0.00      | 0.77*     | 0.01      | -0.05*    | 0.09*     |
| 18. Instit. blockholder | 0.08*     | -0.11*    | -0.06*    | 0.16*     | -0.01     | -0.03     | 0.19*     | -0.07*    | -0.20*    | 0.04      | 0.15*     | 0.10*     | 0.09*     | -0.03     |
| 19. Separate Chair      | -0.01     | -0.08*    | 0.02      | -0.04     | -0.18*    | -0.19*    | -0.17*    | -0.112*   | -0.21*    | -0.40*    | -0.05*    | -0.06*    | -0.06*    | 0.04      |
| 20. Total Compensation  | 0.02      | 0.00      | 0.00      | 0.01      | -0.01     | -0.01     | 0.01      | -0.02     | 0.01      | 0.01      | 0.02      | -0.02     | 0.02      | 0.00      |
| 21. Finance Education   | 0.06*     | 0.08*     | -0.03     | 0.20*     | -0.10*    | -0.10*    | 0.07*     | -0.09*    | -0.08*    | -0.02     | 0.03      | 0.17*     | 0.09*     | -0.06*    |
| 22. Technical Education | 0.16*     | 0.05      | -0.02     | 0.05*     | -0.06*    | -0.06*    | -0.04     | -0.04     | -0.04     | 0.03      | 0.02      | -0.05*    | 0.01      | -0.01     |
| 23. Depression Baby     | -0.01     | 0.04      | 0.02      | -0.02     | 0.46*     | 0.51*     | -0.04     | 0.30*     | 0.19*     | 0.04      | -0.09*    | -0.03     | -0.03     | 0.03      |
| 24. Tobin's Q           | 0.00      | 0.07*     | -0.01     | -0.02     | 0.01      | 0.00      | -0.04     | -0.01     | 0.00      | 0.01      | -0.07*    | -0.02     | -0.02     | -0.21*    |
| 25. ROA                 | 0.01      | -0.13*    | 0.02      | 0.02      | 0.01      | 0.01      | 0.14*     | 0.03      | -0.04     | 0.03      | 0.09*     | 0.05      | 0.05*     | 0.20*     |
| 26. ROE                 | -0.01     | -0.02     | 0.01      | 0.03      | 0.04      | 0.04      | 0.03      | 0.01      | -0.03     | 0.00      | 0.02      | 0.01      | 0.02      | 0.01      |
| 27. CAR (0, 500)        | 0.02      | 0.02      | 0.01      | 0.01      | -0.01     | -0.01     | 0.02      | 0.01      | 0.00      | 0.02      | 0.01      | 0.01      | 0.00      | 0.00      |
|                         |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| 15. Cash Flows by K     | <u>15</u> | <u>16</u> | <u>17</u> | <u>18</u> | <u>19</u> | <u>20</u> | <u>21</u> | <u>22</u> | <u>23</u> | <u>24</u> | <u>25</u> | <u>26</u> | <u>27</u> |           |
| 16. Capex to sales      | 1.00      | 1.00      |           |           |           |           |           |           |           |           |           |           |           |           |
| 17. E-index             | 0.06*     | -0.02     | 1.00      |           |           |           |           |           |           |           |           |           |           |           |
| 18. Instit. blockholder | -0.03     | -0.07*    | 0.14*     | 1.00      |           |           |           |           |           |           |           |           |           |           |
| 19. Separate Chair      | 0.03      | 0.02      | -0.03     | -0.09*    | 1.00      |           |           |           |           |           |           |           |           |           |
| 20. Total Compensation  | 0.01      | -0.01     | 0.01      | 0.00      | -0.02     | 1.00      |           |           |           |           |           |           |           |           |
| 21. Finance Education   | -0.01     | -0.01     | 0.01      | 0.03      | -0.02     | 0.01      | 1.00      |           |           |           |           |           |           |           |
| 22. Technical Education | -0.01     | 0.00      | 0.04      | 0.05      | 0.02      | -0.01     | -0.18*    | 1.00      |           |           |           |           |           |           |
| 23. Depression Baby     | -0.01     | -0.01     | -0.06*    | -0.09*    | -0.12*    | -0.00     | -0.06*    | 0.02      | 1.00      |           |           |           |           |           |
| 24. Tobin's Q           | 0.02      | 0.03      | -0.08*    | -0.10*    | -0.01     | 0.01      | 0.06*     | -0.02     | -0.01     | 1.00      |           |           |           |           |
| 25. ROA                 | -0.07*    | -0.15*    | 0.13*     | 0.15*     | 0.02      | -0.08*    | -0.09*    | 0.03      | 0.03      | -0.40*    | 1.00      |           |           |           |
| 26. ROE                 | -0.01     | 0.00      | 0.01      | 0.09*     | -0.02     | 0.01      | 0.02      | -0.01     | 0.01      | -0.00     | 0.03      | 1.00      |           |           |
| 27. CAR (0, 500)        | 0.07*     | 0.00      | 0.01      | -0.05     | -0.02     | -0.07*    | -0.03     | 0.01      | 0.01      | 0.00      | 0.00      | 0.00      | 1.00      |           |

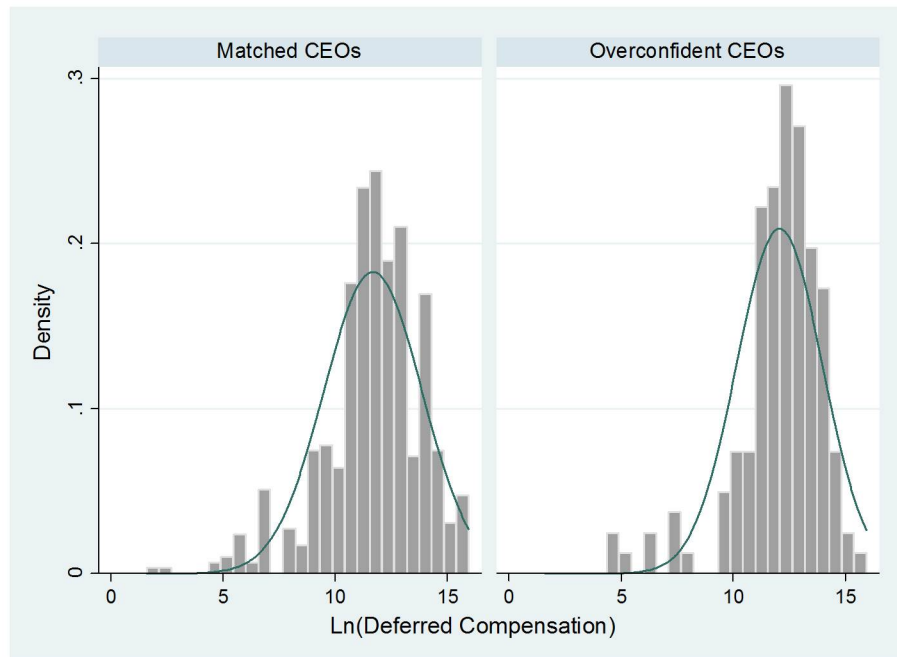
## B. Robustness checks

### CEOs' underdiversification

Our measure of CEO overconfidence is based on the assumption that CEOs personal portfolios are insufficiently diversified. As in Hall and Murphy (2002) and Malmendier and Tate (2005) we presume that because of equity-based incentive compensation a great proportion of CEOs' wealth (on average 66%) is contingent on the market performance of the company that they manage. To control whether this under-diversification hypothesis holds in our sample we would need to look at the CEOs' individual portfolios. Ideally, we would calculate the individual percentage of each CEO's personal wealth that is contingent on his firm's stock market returns. Because this information is unavailable, we can only check whether the CEOs who are identified as overconfident in our sample are more or less under-diversified than the CEOs who were classified as rational. The idea of this test is to assure that overconfident CEO's late exercise (relatively to matched CEOs) is not due to the fact that they have more diversified portfolios.

We proxy for the dependence of CEOs' wealth on the market performance of the firm by the value of their Deferred

Figure A.1: Distribution of Differed Compensation



Notes. Deferred Compensation correspond to the sum of Aggregate Earnings, Long Term Incentive Plan, Executive Contributions, Company Contributions and Compensatory Amount. The full line represents normal distribution. Log values of deferred compensation are reported.

compensation as reported in Forms 10 K. Then we compute the t-statistic of the difference in mean Differed Compensation between the sample of Overconfident CEOs and Matched CEOs. The t-statistic of the null hypothesis equals 0.5825 with a P-value of 0.5605 suggesting that that we cannot reject the hypothesis that the difference in means between the two samples

is equal to zero. In Figure A.1, we plot the density of the log of differed compensation for the two samples. The CEOs in the Overconfident sample have more frequently high levels of Deferred Compensation than the ones in the Matched sample. This might suggest that Overconfident CEOs are actually more under-diversified than rational CEOs. This corroborates the hypothesis of lack of rationality in their exercise behavior and confirms that these CEOs late exercise is not due to stronger diversification.

## Dynamic Panel regressions

In order to assure that we control for the endogeneity of the self-attribution bias and time change in performances we make a separate panel regression that consists in three steps.

- First we regress the annual variance in performance (measured by ROA, ROE and Tobin's Q) of the period 2 years after Overconfidence was revealed, over past annual variances of performance and controls on the sample of Matched CEOs.

$$\Delta Perf_{[(t+2)-(t+1)]} = \alpha + \beta_1 \Delta Perf_{[(t+1)-(t)]} + \beta_2 \Delta Perf_{[(t)-(t-1)]} + \sum_{i=0}^n \beta_i * x_i$$

- Then, we use the estimators from the first regression (the  $\beta_i$ s) to predict the variance in performance ( $\Delta Perf_{[(t+2)-(t+1)]}$ ) of the sample of Overconfident CEOs.
- At last, we compare the predicted values of variance in performances to the observed values of variance in performances. We report in table A.3 the difference in means between these two variables over the three performance measures.

Table A.3: Dynamic Panel Regressions over  $\Delta ROA$ ,  $\Delta ROE$  and  $\Delta$ Tobin's Q

|                                    | Observed<br>values | Predicted<br>values | Difference in means<br>T-stat   P-value |        |
|------------------------------------|--------------------|---------------------|-----------------------------------------|--------|
| $\Delta ROA_{[(t+2)-(t+1)]}$       | -0.1209            | -0.5507             | 2.2731                                  | 0.0236 |
| $\Delta ROE_{[(t+2)-(t+1)]}$       | -0.3999            | -3.2285             | 2.2457                                  | 0.0253 |
| $\Delta Tobin's Q_{[(t+2)-(t+1)]}$ | 2.8613             | 0.6107              | 1.7288                                  | 0.0847 |



# III. CEO overconfidence and corporate tournaments

*With the exception of the instinct of self-preservation, the propensity for emulation is probably the strongest and most persistent of the economic motives.*

-Thorstein Veblen

## 1 Introduction

One of the most important drivers of employees' behavior in corporations is the possibility of internal promotion. Since the seminal work of Lazear and Rosen in 1981, promotion rank order tournaments have been in the center of the academic interest. The literature on this topic mainly studies the incentives scheme that tournaments allow when output based compensation is costly to implement (Ehrenberg and Bognanno, 1990; Kale et al., 2009; Lazear and Rosen, 1981). In parallel, important stylized facts such as the (remarkably uneven) compensation structures at the top executive level in modern corporations have been explained by the idea that such pay differences actually represent tournament prizes used to incentivize lower executive echelons (Canyon et al., 2001; Lazear, 1995).

Most of this literature argues that it is in the shareholder's interest to promote tournament compensation structures when effort supply of the executives is non-contractible and moral hazard is important. More generally however, tournaments can be an appropriate incentivizing mechanism even when effort provision can be contracted upon by means of monitoring or performance-based (piece rates) remuneration. This is because internal tournaments are presumably costless for the shareholders whereas value-based remuneration involves relinquishing of a part of the revenues generated by the firm. Hence

in firms where the shareholders design and implement the compensation structure for the top executives, large pay inequalities between the CEO and the other members of the top management team (TMT) should be observed. However, in many organizations, compensation decisions are decentralized and upper hierarchical echelons decide upon the compensation of their subordinates. In such organizations for example, the CEO has full discretion over the salary of top executives (Finkelstein et al., 2009; Tosi Jr and Gomez-Mejia, 1989) and hence directly influences the level of pay inequality between himself and his subordinates (i.e., the prize that a given executive would gain if he becomes the CEO).

One of the most common characteristics of tournament models is to presume that only the employees who compete for a superior position in a given hierarchy are concerned by the tournament conditions. The incumbent occupant of the contested position is presumed to have no role in the game. Hence, tournament incentives are strictly promotion incentives, they never concern the willingness to stay at a given position. CEOs, who are at the highest hierarchical level of the firm are, in this logic, unaffected by the inside promotion practices and are exclusively incentivized by the external market for managers. In this article we question this hypothesis and argue that CEOs have career considerations inside the firm represented by their willingness to assure long tenure.<sup>1</sup> Therefore they are directly concerned by the contest taking place between their subordinates. With this in mind it can be argued that absent cases of voluntary departures or retirements, CEOs would be rather reticent to put into place highly competitive and incentivizing tournaments between subordinates. On the contrary they would aim to provide top executives with the less possible incentives to replace them.

The simplest way to prevent competition for the leadership position is to reduce the pay inequality between the CEO and the top executives, that is, to minimize the tournament prize.<sup>2</sup> Starting from this intuition, the main question of this article is the following:

---

<sup>1</sup>Since the seminal work of Shleifer and Vishny (1989), entrenchment objectives are considered as one of the major consideration of professional CEOs.

<sup>2</sup>CEOs' concerns for pay equality have been previously addressed from a sociological perspective (Garvey and Swan, 1992). In these papers, CEOs are presumed to have a "distaste for inequality",

how can we explain the substantial pay inequalities (Conyon et al., 2001; Henderson and Fredrickson, 2001; Kaplan, 2008) between CEOs and top executives in firms where corporate governance is imperfect and the CEO's discretion over subordinates' compensation is large? Why would a specific CEO, even a CEO whose revenues are partly contingent on the market performance of the firm, be willing to motivate his subordinates to work harder if it is in the goal to replace him? The purpose of this paper is to show that one possible explanation to this puzzling stylized fact can be CEO overconfidence.

A growing body of empirical and theoretical literature has argued that overconfidence is one of the most common and most influential characteristics of CEOs (Malmendier and Tate, 2005, 2008; Hayward and Hambrick, 1997; Hirshleifer et al., 2012). Relating to this literature we incorporate the overconfidence self-perception bias in our analysis of the way the CEO will react to competitive top executives and the managerial decisions that will follow. To formalize this idea, we model a CEO who underestimates his personal cost of effort whereas he accurately evaluates the cost of effort of his subordinates. As a consequence, he is less averse to the extra effort that inside competition may impose. Our model concerns a CEO who has some interest in the value of the firm (a partial value-based remuneration) and can thus profit from inducing stronger effort levels both from himself and the other members of the firm. This value-based remuneration is however not important enough to cover his disutility in the case of CEO turnover. In turn, his career concerns dominate concerns about the firm's market performance. Furthermore, we presume that value-based remuneration can induce larger effort supply only if the other members of the firm also provide extra effort. In other words, value is significantly increased only if the entire executive team works harder. Otherwise, the marginal utility of an additional unit of effort is below its marginal cost and neither the CEO nor the other executive are willing to work harder. In such a context it can be interesting for the CEO to implement a corporate tournament that will motivate the entire executive team

---

fairness considerations or a willingness for good relationships with subordinates. In our model, the equality concerns of the CEO are purely economic; he values the fact that less pay dispersion will provide less incentives to subordinates to replace him.

as long as he believes that this corporate tournament isn't excessively dangerous for him in terms of career concerns.

Our model formalizes a rank order tournament between three actors: two identical top executives who aim to become a CEO and a CEO who aims to preserve his leadership position. The CEO has an exogenously determined salary (set by the shareholders) but he can decide on the salary of the top executives. When he decides to set a top executive salary that is significantly below his own, he increases the tournament prize for his subordinates and therefore fosters competition. On the contrary, he has no influence upon his own tournament prize because his reservation salary is determined by the external market for top executives. The winner of the tournament for the CEO position is the TMT member that performs the best, which is ex post perfectly correlated with effort supply. All the actors willingly participate to the tournament and adjust their effort levels to maximize their expected utility. As a result, the frequency of CEO turnover is not necessarily affected by the strength of internal competition: since all actors increase their effort supply, the probability of CEO turnover remains the same even though ex-ante they believe that they can alter this probability by working harder.

In this context, our paper makes two important contributions. First, we show that overconfidence can benefit shareholders by “disinhibiting” the CEO towards pay inequalities and internal competition. The fact that the overconfident CEO underestimates the cost of effort has two benefits for the shareholders in our model: (i) it increases the chances that the CEO will be willing to implement a tournament that induces larger effort supply from all the actors of the firm including himself; (ii) it pushes the CEO to overinvest in effort (which objectively reduces his own utility but increases the value of the firm). Our second contribution is to enrich classical models of tournaments by giving an active role to the incumbent holder of the contested position and by modeling a tournament where actors compete for the same job but for different prizes. Moreover, we consider the question of the optimal tournament prize in decentralized organizations where it is

one of the “participants” in the tournament that establishes the size of the reward for his opponents. One additional difference between our model and classical tournament models lies in the fact that in our framework compensation for additional effort for all the players is not entirely fixed and carries a flexible component related to value-based incentives.

Our reasoning applies to organizations who present two important specifics: (i) the agency conflict between shareholders and executives is strong and (ii) tournaments have no negative consequences on firm value. The first feature restricts our analysis to cases where shareholders believe that executives underinvest in effort and are willing to incentivize them through internal promotions rather than costly value-based compensations. The second feature excludes from our model some drawbacks of tournaments that have been explicitly argued by the management literature such as individualistic non-cooperative behaviors or sabotage (Garvey and Swan, 1992; Lazear, 1989). Indeed recent behavioral theorists defend a more nuanced view of inside competition arguing that it can be a good incentivizing mechanism in firms where dissent and uncooperative effort choices induced by intra-employees rivalry are valuable attributes but harmful in firms which need a coordinated and compliant executive team (Henderson and Fredrickson, 2001).

The remainder of this paper is organized as follows. In the next section we present and discuss the related literature and our contributions with regard to this literature. Then, in Section 3 we present the basic framework and hypotheses of the model. The main results are discussed in Section 4. At last we discuss the empirical implications and the possible extensions of our theoretical reasoning. All the proofs are in Appendix.

## 2 Related Literature

Our article is related to several other studies on CEO overconfidence. Like Gervais et al. (2011) we study the interaction between managerial overconfidence and compensation and show how overconfidence can induce a pro-shareholder behavior among CEOs as well as less costly incentivizing practices at the top management level. In their study

however, they focus on the fact that by overestimating the future performance of the firm, overconfident CEOs overvalue flexible value-based remuneration and are more easily incentivized than rational CEOs. In our case, CEOs can predict the future value of the firm accurately (by anticipating all players' effort supply) but they underestimate the disutility of effort and are thus more easily incentivized. Moreover, rather than focusing on the effect of overconfidence on the choice of the compensation contract of the CEO himself we look at its effect on the way the CEO will decide on the compensation of his subordinates.

Another related study is the one of Goel and Thakor (2008). They also formalize the internal promotion practices of top executives and show how internal corporate tournaments for the CEO position create a selection effect favoring more risk takers, i.e., overconfident top executives. The main distinction between our model and the one of Goel and Thakor (2008) concerns the role of the incumbent CEO. Whereas he has no active role in their framework, he is an active player in ours. Moreover, rather than viewing overconfidence as the consequence of competitive corporate tournaments we consider it as their cause. In their model, CEOs are overconfident because corporate tournaments are strongly competitive; in ours; corporate tournaments are strongly competitive because CEOs are overconfident.

Bolton et al. (2013) also propose a model that links CEO overconfidence to the managerial aspects of the CEO function and the motivation of subordinates. In their analysis, overconfidence is defined as the lack of proper learning (information integration). Namely, they study CEOs who overweigh their initial information relative to upcoming signals which makes them resolute as to the execution of one specific corporate strategy. The benefits of this resoluteness are that it can serve as a commitment mechanism, reassuring subordinates that their strategy specific efforts are not likely to be wasted because of a "change in mind" of the leadership. Hence, CEO overconfidence is seen as a way of achieving stronger coordination among employees. The results of our model stand in parallel with this relationship. We predict that CEO overconfidence induces more effort not

because subordinates bet on strategic consistency but because they bet on CEO turnover. However, there aren't any coordination gains in our framework. On the contrary, pushing the competition logic further can generate implications about a decline in coordination (the subordinates can refuse to cooperate with their opponents and dedicate their time to more individualistic efforts).

Another paper that is closely related to ours is the one of Santos-Pinto (2010) who also studies the effects of positive self-image (overconfidence) on the behavior of the actors in a promotion tournament. In his model biased competitors overestimate their personal productivity and sometimes provide more effort. We complement their analysis by including the incumbent CEO in the game and granting him the decision over the tournament prize. Our results corroborate theirs in the sense that positive self-image can be valuable in a tournament context although it reduces the biased actor's objective utility.

### 3 Basic framework

We model a two period-economy in which a firm has three categories of actors: a group of shareholders ( $S$ ), a CEO (also called the leader,  $L$ ) and two top executives competing for the CEO position (followers,  $F = \{i, j\}$ ).

At the beginning of each period the leader and the followers decide their effort supply level,  $e_t^h$  with  $t \in \{1, 2\}$  and  $h \in \{L, i, j\}$ . The cost of effort is  $c(e_t^h) = ke_t^h$  and it is the same for all the TMT members. The productivity of effort is written  $q$  and is also supposed to be the same for all the actors of the game. All rational actors know their productivity and their cost of effort as well as the productivity and the cost of effort of their opponents.

#### Individual performance

In line with traditional tournament models (Lazear and Rosen, 1981; Lazear, 1989) individual performance is seen as a linear function of the productive effort of the player

and a random variable affecting productivity ( $\varphi^h$ ). Because shareholders can only observe the total performance of each actor and not his effort supply, they cannot determine the luck component in individual performances. Tournaments are thus a good way to promote workers as the exogenous random shock on productivity is the same for all the actors.

$$\pi^h = qe_1^h + \varphi^h \quad (1)$$

The random variable  $\varphi^h$  are presumed to be independent and identically distributed around zero. Also, the sum of all actors' productivity shocks is distributed around zero  $E(\sum_{h=L,i,j} \varphi^h) = 0$ .

## CEO overconfidence

A CEO is considered overconfident if he underestimates the cost of his effort. An overconfident CEO's expected cost of effort will be written:

$$c(\widehat{e_t^L}) = (k - b)e_t^L \quad (2)$$

The parameter  $b$  ( $0 \leq b \leq k - \frac{m}{3}Rq$ ) measures the level of overconfidence of the CEO<sup>3</sup> and a CEO is perfectly rational when  $b = 0$ .

## Firm value

Let  $R$  represent the revenues generated by every unit of productive effort. The value of the firm is the sum of all the revenues generated during a given period net of the salaries paid to the TMT members for that specific period.

$$V_t = q(e_t^L + e_t^i + e_t^j)R - \sum_{h=L,i,j} w_h \quad (3)$$

---

<sup>3</sup>The upper limit of the parameter  $b$  comes from a specific restriction developed in Assumption 1 which assures that shareholders have a strong preference for internal tournaments.

## Revenues and tournament prize

Every TMT member of the firm has an exogenously determined compensation contract which contains a fixed salary  $w_h$  and a proportion  $\frac{m}{3}$  of the periodic gross value of the firm which is  $(q(e_t^L + e_t^i + e_t^j)R)$ . The proportion of firm value that is redistributed to the TMT members can be seen as flexible incentivizing remuneration such as stock-options, bonuses or simply inside ownerships that are standard in top executives compensation contracts.<sup>4</sup> All TMT members have the same flexible incentivizing remuneration but there can be differences between the top executives' and the CEO's fixed salary, i.e.,  $w_i = w_j = w_F \leq w_L$ . We presume that the CEO has a complete discretion over the amount of fixed salary offered to the top executives. On the contrary, his personal fixed salary  $w_L$  is exogenously set by the shareholders. Both  $w_L$  and  $w_F$  are fixed for the two periods of the game. Thus, by deciding on the amount of  $w_F$  at the begging of the first period, the CEO sets the prize of the tournament for top executives ( $\Delta w = w_L - w_F$ ).

The flexible remuneration component also remains the same throughout the entire game: the second period Leader (whoever he is) gains  $w_L + \frac{m}{3}Rq \sum e_2^h$  and the second period followers keep  $w_F + \frac{m}{3}Rq \sum e_2^h$ . If the leader is replaced at the end of the first period, his reservation salary is an exogenously fixed amount,  $\underline{w}$ , with ( $\underline{w} < w_L$ ).

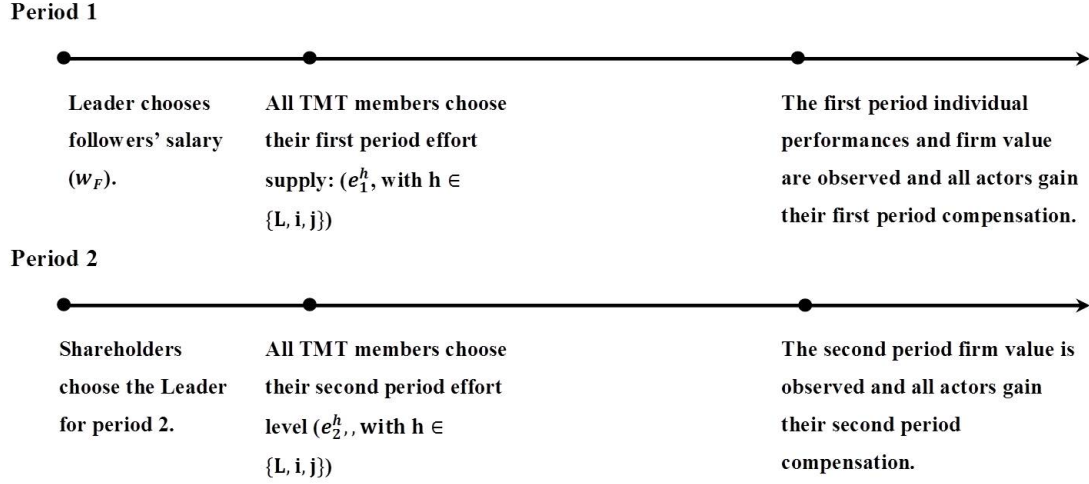
## Timing of the model

The outlet of the game is as follows (see also Figure 1). At the beginning of the first period, the Leader decides whether to implement a highly competitive tournament by setting a consistently inferior salary for the followers. Then he chooses his effort level for the first period of the game ( $e_1^L$ ). Anticipating the leader's effort choice and observing the amount of the "tournament prize" the followers also decide on their own effort levels ( $e_1^{i,j}$ ).

---

<sup>4</sup>Value-based compensation is generally indexed on net revenues. We chose to consider the total cash-flows before salaries because it allows us to isolate considerations about tournament from considerations about maximizing firm value in the CEOs decision on the tournament prize. Presuming a partial redistribution of the net value of the firm to TMT members does not generate a significant change in the main results.

Figure 1: Timeline



At the end of the first period, all TMT members' individual performances are revealed and they gain their total first period compensation

At the beginning of the second period the shareholders of the firm make their turnover decision based on the comparison of all TMT members' first period individual performances.<sup>5</sup> For simplicity reasons we presume that the firm cannot recruit an external candidate and the CEO replacement is always internal. Once the second period Leader is chosen, he and the second period followers chose their effort levels for the last period of the game. The end of the second period is the end of the game in our model. All TMT members are compensated and the final value of the firm  $V_2$  is observed.

## Tournament rules

We formalize the tournament as a two-step game: the first step is the contest between the two followers  $i$  and  $j$ . The winner of this contest,  $F$  with  $F \in \{i, j\}$ , moves forward to the second phase and competes against the leader. Hence, the leader only participates in the second contest. This specific tournament scheme exists in several sport events such as

<sup>5</sup>It can be argued that deciding to replace the leader by a follower based on the comparison of personal performances is unsuitable because the performance of the follower concerns the position of a company's top executive and is not representative of his "to-be" performance at the CEO position (The Peter Principle). It is our belief that being a good top executive can be a reasonable indicator of the chances of being a good CEO. Tasks that are executed by CFOs or COOs are often quite similar to the ones of the CEO and require approximately the same level of knowledge and understanding of the firm, its environment and its challenges.

professional chess tournaments, rugby competitions and linear championships in boxing. The World Chess Championship is the perfect example: before a candidate can confront the reigning champion he must participate in the so called Candidates Tournament. The winner of this tournament is designated “the challenger” and he plays against the incumbent World Champion.

Let  $p_{ih}$  denote the probability that the player  $i$  will win the contest against the player  $h$ . For each phase of the tournament a given follower  $i$  whose individual performance equals  $\pi_i$  has a probability of winning that is defined by the following Tullock success function (Tullock, 1980)<sup>6</sup>:

$$p_{ih} = \frac{\pi_i}{(\pi_i + \pi_h)} \quad (4)$$

Hence, the leader’s probability of remaining at the CEO position when he competes against the challenger  $F$  ( $F \in 1, j\}$ ) can be written:

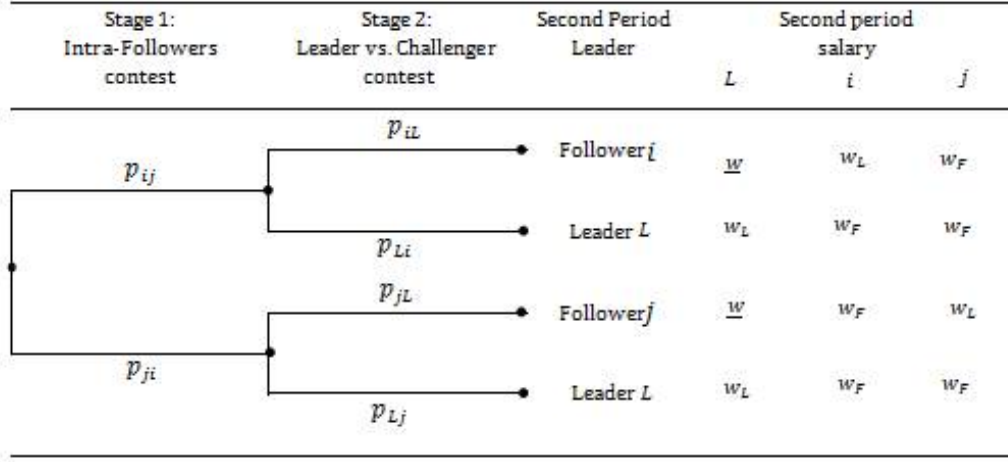
$$p_{LF} = \frac{\pi_L}{(\pi_L + \pi_F)} = 1 - p_{FL} \quad (5)$$

In Figure 2 we show the replacement decision tree and each actor’s second period revenues based on the possible outcomes of the tournament. Some questions may arise as to the criteria of comparison that define this tournament. In our model CEO turnover is decided upon the observation of individual performances and not upon the observation of firm value. Individual performance criteria of replacement are common for private companies where no precise information about firm value is available or industries where market inefficiencies are strong and the firm’s stock price only reflects short term value without integrating long term growth opportunities. Ittner et al. (1997) suggest that individual non-financial performance measures may increase the efficiency in contracting with the manager because they offer better information about the kinds of managerial effort desired by the shareholders. This idea is in line with some empirical evidence concern-

---

<sup>6</sup>This specific contest success function is consistent with frequent tournament formalizations and is often used in the rent seeking contests literature (Gradstein and Konrad, 1999; Rosen, 1986). Skaperdas (1996) axiomatized this functional form and showed that it covers the necessary properties of a success function such as independence from irrelevant alternatives and symmetry.

Figure 2: Tournament outcomes and second period revenues



ing an increasing trend of weighting more accounting-based and individual performance measures in the turnover decisions (Bushman et al., 1996; Engel et al., 2003). Hermalin and Weisbach (1998) also encourage accounting-based measures of performance suggesting that the market value of the firm or stock returns reflect both current management and the expectation of future management changes, while individual performance is the function of the current management only.

## 4 Model Resolution

We resolve the model by backward induction. First we compute the second period effort choices of all the actors. Because the second period is the last period of the game there are no replacement possibilities at this time so the effort choices of all the actors are independent of the tournament characteristics and can only be driven by value-based compensation. In what follows we will presume that without tournaments value-based compensation is an insufficient incentivizing mechanism.

**Assumption 1** *The value-based compensation gained from an additional unit of effort is strictly inferior to its cost for each TMT member, that is,  $\frac{m}{3}Rq < k - b$ .*

Assumption 1 states that without tournaments, i.e., when value-based compensation is the only variable component of the TMT members' expected utility, the marginal utility

of effort is smaller than its marginal cost for both rational and overconfident individuals. The interest of making this hypothesis is that it allows a significant simplification of our analysis. Namely, it allows us to restrict the model to cases where tournaments are always desirable for shareholders.<sup>7</sup>

Assumption 1 also defines an upper limit for the level of overconfidence of the CEO ( $b < k - \frac{m}{3}Rq$ ). Namely, we exclude from our model cases where the level of overconfidence of the CEO is so high that he would provide effort even without tournaments (that is, cases where he perceives almost no cost of effort).

The effort choices of all the actors in the case without tournament incentives (when  $\Delta w = 0$ ) can be derived directly from Assumption 1: since value-based incentives are insufficient to cover the cost of effort, all actors will set their effort supply to zero. Similarly, at the second period of the game, the effort levels of all the actors will be equal to 0 whatever the tournament prize of the first period. This is not to be taken literally. It simply means that without tournaments, TMT members provide the minimal level of effort that allows them not to be fired, which is normalized to zero in our framework. For simplicity we will presume that when TMT members choose this minimal effort level the gross value of the firm simply equals the amount of fixed salaries for executives ( $\sum w_h$ ) so no value is created for shareholders.

**Lemma 1** *The equilibrium effort level for each TMT member at the second period of the game is  $\underline{e}_2^h = 0$ . In the no tournament case ( $\Delta w = 0$ ), the equilibrium effort level of each TMT member at the first period of the game is  $\underline{e}_1^h = 0$  with  $h \in \{i, j, L\}$ .*

In contrast, when the CEO sets an executive salary that is significantly inferior to his own ( $\Delta w$  is positive) all the TMT members have incentives to provide more effort due to their career concerns: the CEO aims to maintain his leadership position while the

---

<sup>7</sup>As previously mentioned, value-based compensation can be seen as a costly incentivizing mechanism by shareholders, especially in firms with large executive teams. To provide the executives with sufficient motive for additional effort, they would need to forgo a significant part of their revenues. On the contrary, internal tournaments are considered as a “costless” incentivizing mechanism in our model. In some cases where tournaments generate sabotage they can reveal costly for shareholders because they generate a reduction of firm value. These considerations are beyond the scope of our model.

top executives aim to replace him. These incentives determine the effort choices for the first period of the game. We will analyze separately how the equilibrium effort choices are affected by the introduction of a corporate tournament in the case where the CEO is rational and the one when the CEO is overconfident. Then we will compare the CEO's willingness to implement a corporate tournament in each of the two cases.

#### 4.1 A promotion tournament when the CEO is rational

Let us presume that the winner of the intra-followers tournament is follower  $F$ , with  $F \in \{i, j\}$ . A rational CEO's two periods expected utility will be written:

$$\begin{aligned} E(U_1^L) &= w_L + \underline{w} + p_{LF}(w_L - \underline{w}) - k(e_1^L + e_2^L) + \frac{m}{3}Rq \sum_{h=\{i,j,L\}} e_t^h \\ &= w_L + \underline{w} + \frac{e_1^L}{e_1^L + e_1^F}(w_L - \underline{w}) - k(e_1^L + e_2^L) + \frac{m}{3}Rq \sum_{h=\{i,j,L\}} e_t^h \end{aligned} \quad (6)$$

Similarly follower  $i$ 's (symmetric for follower  $j$ ) two period expected utility can be written:

$$E(U_1^F) = 2w_F + p_{ij}p_{iL}\Delta w - k(e_1^i + e_2^i) + \frac{m}{3}Rq \sum_{h=\{i,j,L\}} e_t^h \quad (7)$$

Maximizing each actor's expected utility we compute the equilibrium effort levels and make the following proposition:

**Proposition 1** *When a rational CEO implements a tournament at the first period of the game, there is a symmetric equilibrium such that:*

- The leader chooses  $e_1^L = \frac{(w_L - w)\Delta w}{(w_L - w) + w)^2} * \frac{(w_L - w)}{(k - \frac{m}{3}Rq)}$
- Followers choose  $e_1^i = e_1^j = e_1^F = \frac{(w_L - w)\Delta w}{((w_L - w) + w)^2} * \frac{\Delta w}{(k - \frac{m}{3}Rq)}$

This proposition covers two classical results from the tournament literature. First, it shows that each actor's equilibrium effort supply is an increasing function of the prize that he would gain if he wins, i.e.,  $\Delta w$  for the followers and  $(w_L - \underline{w})$  for the leader. Notice that the difference in the tournament prize is the only reason why the equilibrium effort levels of the leader and the followers differ in this case. If the CEO's reservation salary

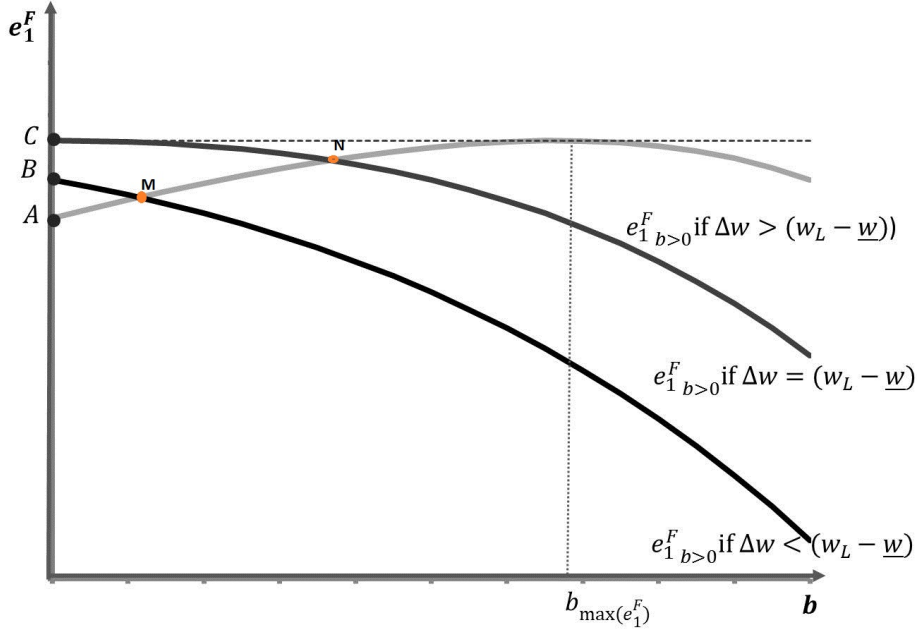
was equal to the followers' remuneration ( $w_L - \underline{w} = \Delta w$ ), the equilibrium effort choices of all the TMT members would be exactly the same and equal to  $\frac{\Delta w}{4(k - \frac{m}{3}Rq)}$ . The CEO replacement would then be random and each follower's ex-post cumulative probability of being promoted (winning both contests) would equal 0.25. This is because by assumption all the TMT members are symmetric in our game, both in terms of productivity and in terms of cost of effort.

The second result, which is also consistent with the tournament literature, states that a given actor will provide effort until its marginal disutility is balanced by the increased chance of winning the tournament prize. In our case the marginal cost of effort  $k$  is lowered by the additional utility related to the value-based incentives of each TMT member,  $\frac{m}{3}Rq$ . Notice however that without this component the effort level would be written  $e_1^h = \frac{\frac{1}{4}\Delta w}{k} * \frac{(w_L - \underline{w})\Delta w}{((w_L - \underline{w}) + \Delta w)^2}$  where  $\frac{1}{4}$  is the joint probability of each actor to win against his two potential opponents thus making effort equal to the ratio between its marginal gain and its marginal cost. For convenience, in what follows we will call the difference between the marginal cost of effort and the marginal utility provided from value-based remuneration ( $k - \frac{m}{3}Rq$ ) the *net cost* of effort in the tournament.

Proposition 1 also contains a more novel result related to the fact that the players in our tournament can compete for different rewards. It can easily be seen that when all actors are symmetric, the one who is the most likely to win the tournament is the one with the “highest stakes” in the game, i.e., the one who competes for the highest prize. Hence we show that, when all actors have the same productivity and cost of effort, the probability of CEO turnover is an increasing function of the difference between what the followers have to gain and what the CEO has to lose in the case of replacement ( $\Delta w - (w_L - \underline{w}) = w_F - \underline{w}$ ).

Moreover, because all actors adapt their effort choices to the anticipated effort supply of their opponents whose prizes they observe, at equilibrium the actor with the highest stakes chooses an effort level that is below the one that equalizes marginal utility to marginal cost, that is, lower than the maximal effort level he could afford. To better

Figure 3: Follower's equilibrium effort choices with respect to CEO overconfidence



explain this result, we plot in Figure 3 the equilibrium effort choices of a follower in three different cases: the case when the followers' prize is smaller than the leader's potential loss, the case where the followers' prize is larger and the case when both prizes are equal. Because the leader is perfectly rational ( $b = 0$ ) for the moment we only focus on the followers' effort choices plotted on the ordinate axis (points A, B and C). The highest effort supply is chosen in the case where the leader's and the followers' prizes are equal (point C). This is because in such a case each follower anticipates that the leader will be exactly as incentivized as him to win the tournament prize and keeps outbidding in terms of effort as long as his marginal cost remains lower than the marginal gain of winning the tournament. This pushes effort choices of each follower upward up to the level where marginal utility equals marginal cost, i.e., the maximal effort level. Building upon this logic it is clear that when each follower knows that he has higher stakes than the leader ( $\Delta w > (w_L - \underline{w})$ ) he doesn't need to attain the maximal effort level. On the contrary, he anticipates the leader's limit and sets up his effort level slightly above it (at point A). At last, when a follower observes that it is the leader who has the highest stakes ( $\Delta w < (w_L - \underline{w})$ ), he knows that the Leader will systematically outbid him in terms of effort and this reduces his incentives to "fight" in the tournament. In other words, because

perceived probability of winning the tournament is lower he would reduce his effort supply below the maximum (at point B). In sum, when the players of the tournament compete for different prizes, the equilibrium effort supply does not always correspond to the one that equalizes marginal cost to marginal utility. Instead, a positive difference in prizes advantages the player with higher stakes who can provide less than the maximal effort and still have stronger chances of winning the tournament. In the next paragraph we analyze how CEO overconfidence impacts these results.

## 4.2 A promotion tournament when the CEO is overconfident

In Proposition 1, we show that the equilibrium effort levels in the case of internal tournaments are a strictly decreasing function of the net marginal cost of effort measured by  $(k - m/3Rq)$ . An overconfident CEO who underestimates his cost of effort will thus be more strongly incentivized by a corporate tournament. Anticipating this, followers need to adjust their effort levels in order to assure a competitive strategy against the CEO. Hence, CEO overconfidence has an impact on the equilibrium effort choices of both the leader and the followers. The next proposition describes all actors' equilibrium effort choices when there is a tournament with an overconfident CEO.

**Proposition 2** *When an overconfident CEO sets a tournament at the first period of the game, there is a semi-symmetric equilibrium such that:*

- The leader chooses  $\hat{e}_1^L = \frac{(w_L - \underline{w})\Delta w(k - \frac{m}{3}Rq)}{((w_L - \underline{w})(k - \frac{m}{3}Rq) + \Delta w(k - \frac{m}{3}Rq - b))^2}(w_L - \underline{w})$
- Followers choose  $e_{1b>0}^i = e_{1b>0}^j = e_{1b>0}^F = \frac{(w_L - \underline{w})\Delta w(k - \frac{m}{3}Rq - b)}{((w_L - \underline{w})(k - \frac{m}{3}Rq) + \Delta w(k - \frac{m}{3}Rq - b))^2}\Delta w$

It is direct from proposition 2, that the impact of CEO overconfidence on the equilibrium effort level of the leader is strictly positive. The relationship between the equilibrium effort levels of the followers and CEO overconfidence is less immediate. For sure, anticipating that overconfidence will positively influence the effort choices of the leader, followers who have high incentives to win need to increase their personal effort supply in order to outperform the CEO. This effect is however limited because followers objectively perceive the cost of “bidding higher” in terms of effort whereas the CEO underestimates this cost.

In Corollary we summarize show how equilibrium effort choices and CEO overconfidence are correlated.

**Corollary 1** *For a given tournament prize  $\Delta w$ , CEO overconfidence has a strictly positive effect on the level of effort provided by the CEO. The effect of CEO overconfidence on the top executives' equilibrium effort supply is positive if  $b < b_{\max(e_1^F)} = \frac{(\Delta w - (w_L - \underline{w}))}{\Delta w} (k - \frac{m}{3} Rq)$  and negative otherwise.*

To better understand the second part of Corollary 1, recall that when  $\Delta w > (w_L - \underline{w})$  the followers do not provide the maximal effort level, because they adapt their decision to their anticipation of the leader's equilibrium effort choice. Hence, in this case, they have a certain leeway to increase their effort while keeping marginal utility above marginal cost (this leeway is presented by the difference between point A and point C in Figure 3). As the leader increases his effort because of his overconfidence, the followers can try to outbid by increasing their own effort supply up to the maximal effort level (the dotted line in Figure 3). However, starting from a certain level of CEO overconfidence ( $b_{\max(e_1^F)}$ ), the equilibrium effort choice of the leader is so high that the followers, despite their higher stakes in the game, have no more incentives to outbid him (their cost of effort outweighs their expected gain). From this point onward, as the CEO overconfidence increases the followers are less and less incentivized by the tournament and decrease their effort supply. In this sense, the point  $b_{\max(e_1^F)}$  represents the level of overconfidence that maximizes incentives for followers in a tournament where they compete for a higher prize.

Another way to understand this result is to consider the underestimation of cost due to CEO overconfidence as a *relative surplus of incentives for the leader* that can be written as the ratio  $\frac{b}{k - \frac{m}{3} Rq}$  and the “higher stakes” of the followers as a *relative surplus of incentives for the followers* that can be written  $\frac{\Delta w - (w_L - \underline{w})}{\Delta w}$ . As long as the relative surplus of incentives of the followers remains larger, an increase of CEO overconfidence will drive them to higher effort. When the leader's surplus of incentives becomes larger, the followers perceive a lower probability to win and are less incentivized by the tournament. Of course, when the followers have no surplus in incentives at all ( $\Delta w \leq (w_L - \underline{w})$ ) their reaction to overconfidence is always to reduce effort supply (as shown in the black curves

of figure 3). In those cases,  $b_{max}(e_1^F) \leq 0$  and for any positive level of CEO overconfidence, the followers perceive lower chances of winning the tournament and reduce their equilibrium effort supply. Further along, we will see how these effects of overconfidence on effort choices affect firm value and shareholders' welfare.

The next step of our analysis consists in looking at the initial decision of the CEO, i.e., his choice of the firm's compensation structure and promotion incentives. Because both the leader's fixed salary  $w_L$  and his reservation salary  $\underline{w}$  are exogenously fixed, the follower's salary  $w_F$  completely defines the level of competition in the corporate tournament. Hence, we will verify the conditions under which competitive tournaments are preferable for the leader (and thus feasible) and the size of the tournament prize that he would be willing to set at equilibrium.

### 4.3 Tournament conditions and prize

The following trade-off characterizes the CEO's decision whether or not to create a competitive environment for his subordinates: on one hand he has some distaste for competitive tournaments because they require higher levels of costly effort to assure the continuity of his leadership. On the other hand, the increased incentives (for all the TMT members) created by the tournament are valuable to him because they generate higher firm value and thus higher personal value-based revenues.<sup>8</sup> Because of this trade-off, the CEO will be willing to set a tournament compensation structure only if his two-period expected utility in this case is larger than the two-period expected utility in the "no tournament" case which equals  $2w_L$ . Based on this argument we make the following proposition.

---

<sup>8</sup>The implementation of a tournament can be seen in this case as a self-disciplining mechanism for the CEO as it consists in deliberately creating a situation where he needs to provide higher efforts. However, that is not the main driver of the CEO's decision in our model. By setting a high tournament prize the CEO counts on the externalities related to the followers' increased effort. In the no tournament case, by increasing his effort level an individual agent can only count on his personal effect on firm value which is insufficient to cover the marginal disutility of effort (by assumption A1). In the tournament case, all the actors provide more effort because they want to increase their probability of winning. Then, the gain of the "triple" contribution to the value of the firm can outweigh individual disutility of effort and make tournaments desirable.

**Proposition 3** *A rational CEO will implement a tournament if and only if  $mRq > k$ . An overconfident CEO will implement a tournament if and only if  $mRq > k - b$ . When a tournament is implemented, both the rational and the overconfident CEO set a tournament prize  $\Delta w^* = \frac{(k - \frac{m}{3}Rq)}{2\frac{m}{3}Rq}(w_L - \underline{w})$ .*

Proposition 3 states that a given CEO will be willing to incentivize all the TMT members including himself through a corporate tournament only if the total marginal utility of all the TMT members ( $mRq$ ) outweighs the individual marginal cost that he perceives, i.e.,  $mRq > k - b$  with  $b \in [0, \frac{m}{3}Rq]$ . Furthermore, it shows that an overconfident CEO is more likely to implement an internal promotion tournament. The reason for this follows immediately from Corollary 1, overconfidence always has a positive effect on the CEO's equilibrium effort supply whereas its effect on the followers' effort choice is either weakly positive or negative. As a consequence, the overconfident leader's (perceived and objective) probability to win the tournament is higher than the one of a realistic CEO ( $p_{LF} = \frac{\widehat{e_1^L}}{\widehat{e_1^L} + e_1^F} = \frac{(w_L - \underline{w})(k - \frac{m}{3}Rq)}{(w_L - \underline{w})(k - \frac{m}{3}Rq) + \Delta w(k - \frac{m}{3}Rq - b)}$ ). In turn, the overconfident CEO will be more likely to choose a competitive internal promotion system with large pay inequalities.<sup>9</sup>

It is important to notice that the fact that the overconfident CEO correctly perceives his probability of winning is strongly related to our definition of overconfidence. By underestimating his cost of effort the overconfident actor in our tournament provides too much effort but he can correctly evaluate, given the effort that he chooses to provide, his probability to win. This formalization of overconfidence is in line with Ludwig et al. (2011) but it is different from Santos-Pinto (2010) where overconfidence is defined as the individual's tendency to overestimate his productivity. In their model, overconfidence leads to a biased perception of the probability to win because the overconfident competitor, believing that his productivity is higher than the one of his opponents, provides less effort than he objectively should. So, his objective chances of winning are reduced, although he subjectively believes that they are not. In our framework, it is the contrary; the negative consequences of overconfidence for the biased individual due to overinvestment in effort

---

<sup>9</sup>Because  $w_L$  is exogenously fixed, the followers fixed salary at equilibrium follows directly from proposition 1 and equals  $w_F^* = w_L - \frac{(w_L - \underline{w})(k - \frac{m}{3}Rq)}{2\frac{m}{3}Rq} = \frac{3(mRq - k)w_L - (3k - mRq)\underline{w}}{2mRq}$ .

are (partly) balanced by the increased probability of winning.<sup>10</sup>

The major question that follows from this result is whether the overconfident CEO's objective utility is increased or on the contrary decreased when a tournament is implemented? Looking more precisely on the CEO's objective utility function, we can distinguish three potential effects of overconfidence. First, as we already said, overconfidence increases the CEO's objective probability of remaining at the CEO position. Second, overconfidence has an ambiguous effect on the CEO's value-based revenues because it both increases his own effort supply and it (sometimes) decreases the effort provided by the followers.<sup>11</sup> Third, overconfidence increases the objective cost of effort of the overconfident CEO. To see which of these effects prevails we look at the total ex-post objective utility of the overconfident CEO ( $U_{1\ b>0}^L$ ) when a tournament is implemented (the effort levels are as in Proposition 2 and the tournament prize is as in Proposition 3).

$$\begin{aligned}
U_{1\ b>0}^L = w_L + \underline{w} + & \frac{(w_L - \underline{w})(k - \frac{m}{3}Rq)}{[(w_L - \underline{w})(k - \frac{m}{3}Rq) + (w_L - \underline{w})\frac{(k - \frac{m}{3}Rq)}{2\frac{m}{3}Rq}(k - \frac{m}{3}Rq - b)]}(w_L - \underline{w}) \\
& + \frac{m}{3}Rq \frac{\frac{(w_L - \underline{w})^2(k - \frac{m}{3}Rq)^2}{2\frac{m}{3}Rq} + \frac{2(w_L - \underline{w})^3(k - \frac{m}{3}Rq)^2(k - \frac{m}{3}Rq - b)}{(2\frac{m}{3}Rq)^2}}{[(w_L - \underline{w})(k - \frac{m}{3}Rq) + (w_L - \underline{w})\frac{(k - \frac{m}{3}Rq)}{2\frac{m}{3}Rq}(k - \frac{m}{3}Rq - b)]^2} \\
& - k \frac{(w_L - \underline{w})^2\frac{(k - \frac{m}{3}Rq)^2}{2\frac{m}{3}Rq}}{[(w_L - \underline{w})(k - \frac{m}{3}Rq) + (w_L - \underline{w})\frac{(k - \frac{m}{3}Rq)}{2\frac{m}{3}Rq}(k - \frac{m}{3}Rq - b)]^2}
\end{aligned} \tag{8}$$

With simple algebra equation (8) reduces to:

$$U_{1\ b>0}^L = w_L + \underline{w} + \frac{2\frac{m}{3}Rq}{(\frac{m}{3}Rq + k - b)}(w_L - \underline{w}) - \frac{2(w_L - \underline{w})\frac{m}{3}Rq}{(\frac{m}{3}Rq + k - b)^2}b \tag{8a}$$

---

<sup>10</sup>Notice that when overconfidence consists in the underestimation of the cost of effort it always leads to higher effort supply. On the contrary when the bias consists in the overestimation of productivity, it can either induce less effort (if productivity is a substitute to effort) or it can encourage more effort (if productivity is a complement to effort). For a broader analysis of this issue see De la Rosa (2011) and Santos-Pinto (2010).

<sup>11</sup>The ambiguity of this influence is due to the fact that the positive effect of overconfidence on the equilibrium effort supply of the CEO is larger than the potential negative effect of overconfidence on the effort supply of the followers but the followers are more numerous (two in our model) so their contribution to firm value is more important. Further on, we show that the net effect of overconfidence on the total effort level of and on firm value is positive up to a certain level of  $b$  and negative beyond.

It is obvious from equation (8a) that because the overconfident CEO overinvests in effort at equilibrium, the increase in value-based remuneration is smaller than the marginal cost of effort. Hence, the benefits of overconfidence related to value-based remuneration are completely canceled out. In turn, at equilibrium the net effect of overconfidence on the CEO's objective utility has only two components: the increased chances of winning the tournament (reflected in  $\frac{2\frac{m}{3}Rq}{(\frac{m}{3}Rq+k-b)}(w_L - \underline{w})$ ) and the utility loss due to overinvestment in effort (reflected in  $-\frac{2(w_L - \underline{w})\frac{m}{3}Rqb}{(\frac{m}{3}Rq+k-b)^2}$ ). The following proposition summarizes the net effect of overconfidence on the objective utility of the overconfident CEO. Also, we compare the overconfident CEO's objective utility to the objective utility of a rational CEO, when both have incentives to implement a tournament.

**Proposition 4** *When a tournament is implemented, the objective utility of an overconfident CEO is negatively correlated with his level of overconfidence and inferior to the utility of a rational CEO.*

Combining Propositions 3 and Proposition 4 generates one important empirical implication of our model. Although overconfident CEOs establish a highly competitive environment too often, they are less likely to be outperformed and lose the tournament against their subordinates. However, they bare important costs because they put themselves in a situation where they are incentivized to overinvest in effort by implementing tournaments when, from an objective perspective, they shouldn't.

In the next paragraph we check whether this increased tendency to implement tournaments along with the other effects of CEO overconfidence is beneficial to the shareholders of the firm.

#### 4.4 Shareholders welfare

Compared to the no-tournament case, the introduction of an internal tournament increases the effort levels of all the actors, so it has a positive effect on the value of the firm. As a consequence, shareholders will always prefer a tournament system rather

than pay equality. It is direct from Proposition 3 that to assure the implementation of a tournament, the shareholders should simply set the value-based incentives of TMT members as high as possible. But value-based remuneration is costly because it reduces the proportion of firm value that they can keep for themselves. Let  $E(U^S | b)$  denote the expected utility of shareholders given the level of overconfidence of the CEO. Replacing for the optimal prize and effort levels allows us to write the shareholder's objective function as follows:

$$\begin{aligned} E(U^S | b) &= Prob(mRq \geq k - b)[(1 - m)q(e_1^L + 2e_{1 \ b>0}^F)R - w_L - 2w_F] \\ &= Prob(mRq \geq k - b)[(1 - m)Rq \frac{2(w_L - w)(k - b)}{(\frac{m}{3}Rq + k - b)^2} - 3w_L + (w_L - w) \frac{(k - \frac{m}{3}Rq)}{\frac{m}{3}Rq}] \end{aligned} \quad (9)$$

Notice that when the condition for a positive utility for shareholders is respected ( $mRq \geq k - b$ ), any increase in  $m$  negatively influences the shareholders expected utility. The first reason for this is trivial: the higher  $m$  the lower the proportion of gross value that is finally perceived by the shareholders. Two additional negative effects of  $m$  on shareholders wealth hold on the negative correlation between this parameter, and the equilibrium tournament prize for the followers chosen by the CEO,  $\Delta w^*$ . First, because it reduces the tournament prize,  $m$  negatively affects the incentivizing power of the tournament so the total effort level of all the TMT members is lower. Second, because a high tournament prize automatically translates in low salary for followers, shareholders always prefer the highest possible tournament prize ( $m$  being negatively correlated with the tournament prize they would prefer the lowest possible  $m$ ). With regard to these results we specify the shareholders' choice of  $m$  in the following proposition.

**Proposition 5** *For a given level of CEO overconfidence  $b$ , the shareholders of the firm will redistribute to TMT members a proportion of the gross value of the firm  $m^* = \frac{k-b}{Rq}$ .*

Proposition 5 tells a classical story from agency theory. Because the interests of shareholders and executives are at odds and can be brought more into alignment, shareholders need to proceed to a costly strategy that would incentivize executives. Namely, in our case they need to relinquish a part of their rights to the firm value to TMT members.

Our contribution to this well-studied issue is to show how CEO overconfidence can act as a substitute to this costly strategy as it reduces the need of interest-alignment (the higher the level of overconfidence the less the proportion of value that shareholders need to redistribute to TMT members). This is because overconfident CEOs who underestimate their cost of effort are not only more easily incentivized but also keener to incentivize other executives by establishing strong pay inequalities. In this sense value-based incentives and CEO overconfidence interact in their effect on shareholders' wealth: the stronger the CEO's overconfidence the lower the cost of interest alignment.

In the next question we discuss our main empirical implications shareholders' preferences about CEO overconfidence and the turnover of overconfident CEOs.

## 5 Discussion and empirical implications

### 5.1 Implications on shareholders' preferences over CEO overconfidence

So far we have defined the parameter  $m$  as the proportion of firm value that is redistributed to the TMT members. As such, it measured the degree to which shareholders are willing to implement a costly strategy in order to reduce what they perceive as underinvestment in effort from executives. An alternative way of seeing the parameter  $m$  is to consider it as a reversed measure of the severity of the shareholders-executives (SE) agency conflicts. We would then say that the executives and shareholders interests are less at odds when  $m$  is large and conflicts of interest are more serious when  $m$  is small.<sup>12</sup> Hence, the parameter  $m$  becomes an exogenous variable in our model. In what follows we focus on the way the shareholders preferences concerning CEO overconfidence are related to the severity of the SE agency conflicts. Our question is whether, for a given level of  $m$ ,

---

<sup>12</sup>The management literature refers to the lack of shareholders-executives agency conflicts as "stewardship". More precisely, stewardship theory argues that there can be a strong relationship between the success of an organization and the executives' personal satisfaction (Davis et al., 1997). Such executives (stewards) believe that their interests are aligned with those of the shareholders and behave accordingly by working to maximize firm value.

shareholders are more or less likely to recruit an overconfident CEO.

Let us presume, as previously, that shareholders always prefer tournaments (Assumption 1 holds). As shown in proposition 3, overconfident CEOs implement tournaments more often. In turn, we would expect that shareholders prefer them to rational CEOs. However, this is not systematically the case. In firms where SE agency conflicts are weak ( $m > \frac{k}{Rq}$ ) and both rational and overconfident CEOs would willingly implement a corporate tournament, the shareholders' preferences will depend on the impact of CEO overconfidence on the total effort level provided by the TMT members. Recall from Corollary 1 that, although CEO overconfidence always increases the effort supply of the leader, followers reduce their effort provision whenever CEO overconfidence is above a certain benchmark,  $b_{\max}(e_1^F)$ . In such cases shareholders need to consider whether the surplus of the leader's effort supply dominates the decline in followers' effort supply. The next proposition describes the shareholders preferences with regard to CEO overconfidence for different levels of interest alignment between shareholders and executives,  $m$ :

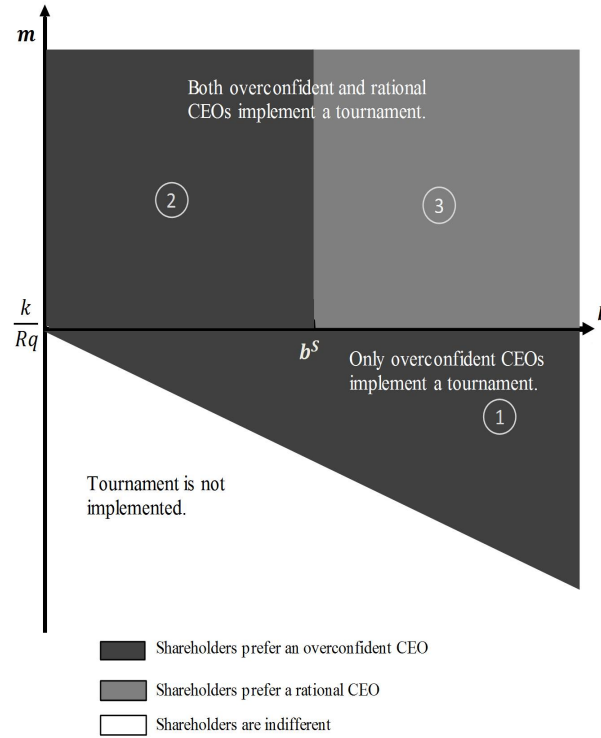
**Proposition 6** *When the level of shareholders-executives agency conflicts is exogenous the shareholders preferences over CEO overconfidence are as follows:*

- *When  $m < \frac{k-b}{Rq}$ , i.e., for very high levels of SE agency conflicts, shareholders are indifferent between an overconfident and a rational CEO.*
- *When  $\frac{k-b}{Rq} \leq m < \frac{k}{Rq}$ , i.e., for high to moderate levels of SE agency conflicts, shareholders systematically prefer overconfident CEOs.*
- *When  $m > \frac{k}{Rq}$ , i.e., for low levels of SE agency conflicts, shareholders prefer an overconfident CEO as long as CEO overconfidence is moderate ( $b \leq b_S = \frac{k^2 - (\frac{m}{3}Rq)^2}{k}$ ) and a rational CEO when CEO overconfidence is strong  $b > b_S$ .*

More generally, shareholders have two levels of considerations. First they care about recruiting the CEO who will implement a tournament in their firm. Then, their second-order consideration is to recruit the CEO who will implement the most incentivizing tournament. This second-order consideration is only valid when both the rational and

the overconfident CEOs are willing to implement a tournament, i.e., the cases where  $m > \frac{k}{Rq}$ . In those cases, shareholders favor moderately overconfident CEOs, but dislike too high levels of overconfidence. In Figure 3 we present this idea graphically. In firms where executives are weakly motivated by organizational success and SE conflicts are severe (below the x-axis level), shareholders need a CEO whose overconfidence is strong enough to assure a pro-shareholder behavior among TMT members by implementing a corporate tournament. When such a CEO is available (region 1 in Figure 3) they willingly hire him regardless of how high his overconfidence level is.

Figure 4: Shareholders' preferences over CEO overconfidence



On the contrary in firms where the TMT members' interests are more aligned to the interest of shareholders,  $m > \frac{k}{Rq}$ , CEO overconfidence becomes less valuable for shareholders because rational CEOs would also willingly implement a tournament. However, as shown in Proposition 1, even in those cases, overconfident CEOs can be preferable because they compete more aggressively in the tournament and provide more effort than realistic CEOs. As long as overconfidence is not too high (region 2 in Figure 3) this

more aggressive behavior is beneficial for the shareholders either because it creates higher incentives for the followers (cf. Corollary 1) or because the higher incentives of the leader induced by overconfidence overpass the loss in incentives for the followers. When CEO overconfidence is superior to  $b_S$  (Region 3 in Figure 3) this is no longer true and the benefits of the reinforced competitiveness of the CEO are outweighed by the loss of incentives for the followers. In that case, the shareholders prefer recruiting a rational CEO. The main implication of this idea is that the optimality of CEO overconfidence depends on firm characteristics.

Recent theoretical and empirical developments in the tournament literature argue that in some cases the benefits of a tournament-like compensation structure are dominated by various social costs of intra-colleagues competition. This literature points out that tournaments can provoke individualistic behaviors and sabotage and reduce cohesiveness and cooperation between TMT members (Garvey and Swan, 1992; Henderson and Fredrickson, 2001; Lazear, 1989). In firms where team work is essential for success such social consequences can harm the firm's performance and lead to a decline in firm value (Ridge et al., 2014). Wide-ranging empirical evidence illustrates this point. Bloom (1999) shows for example that in baseball, pay dispersion in a team has negative effects on performance, whereas Ehrenberg and Bognanno (1990) confirm that higher prizes in golf tournaments guarantee better performance of individual players.

In light of this literature it is important to specify that our model concerns firms where the main factor of value creation is the individual performance of TMT members. Hence our results about the benefits of CEO overconfidence apply to firms where the risk of sabotage or/and the need of mutual assistance and cooperation between the TMT members are weak. An empirical analysis of our theory would need to control for this restriction by including proxies of the firm's coordination needs such as subsidiaries relatedness, number of business units or the intensity of interdependence between different corporate departments (Henderson and Fredrickson, 2001).

## 5.2 Implications on CEO turnover

The second main implication of our model is to show that overconfident CEOs who underestimate their cost of effort are less likely to be replaced. This is true in our model regardless of the pay inequalities in the firm and the level of internal competition. One of the rare empirical studies that relate CEO overconfidence to corporate turnover is the one of Campbell et al. (2011) according to which rational CEOs are more likely to face forced turnover than (moderately) overconfident CEOs. They relate this result to the fact that moderate levels of CEO overconfidence allow better interest alignment between shareholders and executives. Our model is in line with this prediction as we argue that overconfident CEOs have lower chances of being outperformed and eventually replaced even though they are more likely to use the possibility of turnover as an incentivizing mechanism for the executives.

Moreover, we contribute to a better understanding of the relationship between top executives' pay gap and CEO turnover. Two contradictory views have been presented in the academic literature. On the one hand, *the managerial power perspective* considers that pay inequalities in top management teams are due to inefficient corporate governance and inflated power of the CEO (Finkelstein et al., 2009; Tosi Jr and Gomez-Mejia, 1989). According to this perspective we should observe a negative relationship between TMT pay gaps and CEO turnover and between pay gaps and firm performance. This is because TMT pay gaps in a firm are seen as evidence for the presence of a powerful and entrenched CEO who has the leeway to make decisions that are not in the interest of shareholders. On the other hand, *tournament theory* (Kale et al., 2009; Lazear, 1995), argues that pay inequalities are deliberately installed to motivate executives. This theory predicts that CEO turnover should be more frequent in firms with large pay inequalities (Kale et al., 2009; Bebchuk et al., 2011). Moreover, because they provide stronger incentives for executives, pay inequalities are presumed to generate an increase in firm value according to this view. Shen et al. (2010) empirically examine this debate and find that "*CEO pay and its ratio over the average pay of the firm's four other highest paid executives have a*

*negative effect on CEO turnover and dismissal*” (Shen et al., 2010, p.729). They argue that this finding corroborates the managerial power perspective and contradict tournament theory’s explanation of TMT pay inequalities.

Our model stands in contrast with this interpretation and suggests an alternative theory of the link between pay inequalities, CEO turnover and firm performance. First, we show that the CEO who actively participates in a tournament will act as the other competitors and adjust his effort choice to the anticipated effort choices of other players thereby reducing the probability of turnover. This is even more strongly verified when the CEO is overconfident because by underestimating his cost of effort such a CEO can compete more aggressively in the tournament and reduce even more the probability of replacement. Hence, our prediction about the relationship between pay inequalities and CEO turnover is similar to the one of the managerial power perspective but the mechanism that is behind this relationship is different; they presume CEO entrenchment whereas we presume the CEO’s active adaptation in the tournament. Second, the increased incentives for executives created by the implementation of a tournament are in our model, as in the classical tournament literature, beneficial for shareholders. In this sense, we contradict the managerial power perspective concerning the effect of pay inequalities on firm performance.

To summarize, our model’s empirical predictions relate to both views of TMT pay inequality in the following way: like tournament theory we predict a positive impact of pay inequality on firm value and like managerial power theory we predict a negative correlation between pay inequality and CEO turnover. Hence, the most suitable way to test our theory would be to explore simultaneously the impact of TMT pay gaps on CEO turnover and on firm value. Such an empirical testing would allow us to discriminate between the two theories described above and our theoretical proposition regarding the turnover and performance consequences of pay inequalities.

## 6 Conclusion

The widespread public representation of effective top management teams is an image of cooperation, shared vision and unity. Often successful CEOs speak of leadership as the “art of growing others” (Jack Welch, former CEO of General Electric) or the ability to “inspire and persuade” (Tim Cook, CEO of Apple) and praise teamwork and voluntary followership. Emulation and rivalry are rarely presented as drivers of organizational success. This paper proposes a theory that is contrary to this vision of top management teams and makes a case for intra-executives competition and the willingness to rise to the top of the corporate hierarchy. We study an organization where individualistic career concerns and internal competition rather than cohesiveness and cooperation are the firm’s success factors. We believe that, with the exception of some corporations managed by charismatic leaders or very entrenched CEOs, most corporate contexts in modern corporations progress through internal competition and rivalry.

Our model predicts a positive effect of CEO overconfidence on firm value conveyed by the fact that overconfident CEOs are more likely to promote a competitive environment that generates tournament incentives for the top executives in the firm. This prediction is not only at odds with a rather consensual negative view of CEO overconfidence in the academic literature but it also contributes to our understanding of the various mediators of the relationship between CEO overconfidence and firm performance. The kinds of effects of overconfidence that we present here are unrelated to investment policies (Malmendier and Tate, 2005) or financing decisions (Gervais et al., 2011) or even strategic choices (Hayward and Hambrick, 1997) but rather explore the managerial role of the CEO and his decisions in terms of internal corporate governance. In this sense, we contribute to a scarcely explored aspect of the CEO overconfidence bias and formalize some important intuitions with regard to its overall impact on performance. Moreover, we provide some theoretical support for the idea that CEO overconfidence can be seen as an alternative to classical corporate governance mechanisms as it allows a stronger alignment of the interests of shareholders and executives.

## References

- Bebchuk, L. A., Cremers, K., and Peyer, U. C. (2011). The CEO pay slice. *Journal of Financial Economics*, 102(1):199–221.
- Bloom, M. (1999). The performance effects of pay dispersion on individuals and organizations. *Academy of Management Journal*, 42(1):25–40.
- Bolton, P., Brunnermeier, M. K., and Veldkamp, L. (2013). Leadership, coordination, and corporate culture. *The Review of Economic Studies*, 80(2):512–537.
- Bushman, R. M., Indjejikian, R. J., and Smith, A. (1996). CEO compensation: The role of individual performance evaluation. *Journal of Accounting and Economics*, 21(2):161–193.
- Campbell, T. C., Gallmeyer, M., Johnson, S. A., Rutherford, J., and Stanley, B. W. (2011). CEO optimism and forced turnover. *Journal of Financial Economics*, 101(3):695–712.
- Canyon, M. J., Peck, S. I., and Sadler, G. V. (2001). Corporate tournaments and executive compensation: Evidence from the uk. *Strategic Management Journal*, 22(8):805–815.
- Davis, J. H., Schoorman, F. D., and Donaldson, L. (1997). Toward a stewardship theory of management. *Academy of Management Review*, 22(1):20–47.
- De la Rosa, L. E. (2011). Overconfidence and moral hazard. *Games and Economic Behavior*, 73(2):429–451.
- Ehrenberg, R. G. and Bognanno, M. L. (1990). Do tournaments have incentive effects? *The Journal of Political Economy*, 98(6):1307–1324.
- Engel, E., Hayes, R. M., and Wang, X. (2003). CEO turnover and properties of accounting information. *Journal of Accounting and Economics*, 36(1):197–226.
- Finkelstein, S., Hambrick, D. C., and Cannella, A. A. (2009). *Strategic leadership: Theory*

- and research on executives, top management teams, and boards.* Oxford University Press.
- Garvey, G. T. and Swan, P. L. (1992). Managerial objectives, capital structure, and the provision of worker incentives. *Journal of Labor Economics*, pages 357–379.
- Gervais, S., Heaton, J., and Odean, T. (2011). Overconfidence, compensation contracts, and capital budgeting. *The Journal of Finance*, 66(5):1735–1777.
- Goel, A. M. and Thakor, A. V. (2008). Overconfidence, CEO selection, and corporate governance. *The Journal of Finance*, 63(6):2737–2784.
- Gradstein, M. and Konrad, K. A. (1999). Orchestrating rent seeking contests. *The Economic Journal*, 109(458):536–545.
- Hayward, M. L. and Hambrick, D. C. (1997). Explaining the premiums paid for large acquisitions: Evidence of CEO hubris. *Administrative Science Quarterly*, pages 103–127.
- Henderson, A. D. and Fredrickson, J. W. (2001). Top management team coordination needs and the ceo pay gap: A competitive test of economic and behavioral views. *Academy of Management Journal*, 44(1):96–117.
- Hermalin, B. E. and Weisbach, M. S. (1998). Endogenously chosen boards of directors and their monitoring of the CEO. *American Economic Review*, pages 96–118.
- Hirshleifer, D., Low, A., and Teoh, S. H. (2012). Are overconfident CEOs better innovators? *The Journal of Finance*, 67(4):1457–1498.
- Ittner, C. D., Larcker, D. F., and Rajan, M. V. (1997). The choice of performance measures in annual bonus contracts. *Accounting Review*, pages 231–255.
- Kale, J. R., Reis, E., and Venkateswaran, A. (2009). Rank-order tournaments and incentive alignment: The effect on firm performance. *The Journal of Finance*, 64(3):1479–1512.

- Kaplan, S. N. (2008). Are US CEOs overpaid? *The Academy of Management Perspectives*, 22(2):5–20.
- Lazear, E. P. (1989). Pay equality and industrial politics. *Journal of Political Economy*, pages 561–580.
- Lazear, E. P. (1995). Personnel economics. *MIT Press Books*, 1.
- Lazear, E. P. and Rosen, S. (1981). Rank-order tournaments as optimum labor contracts. *The Journal of Political Economy*, 89(5):841–864.
- Ludwig, S., Wichardt, P. C., and Wickhorst, H. (2011). Overconfidence can improve an agent’s relative and absolute performance in contests. *Economics Letters*, 110(3):193–196.
- Malmendier, U. and Tate, G. (2005). CEO overconfidence and corporate investment. *The Journal of Finance*, 60(6):2661–2700.
- Malmendier, U. and Tate, G. (2008). Who makes acquisitions? CEO overconfidence and the market’s reaction. *Journal of Financial Economics*, 89(1):20–43.
- Ridge, J. W., Aime, F., and White, M. A. (2014). When much more of a difference makes a difference: Social comparison and tournaments in the CEO’s top team. *Strategic Management Journal*.
- Rosen, S. (1986). Prizes and incentives in elimination tournaments. *The American Economic Review*, pages 701–715.
- Santos-Pinto, L. (2010). Positive self-image in tournaments. *International Economic Review*, 51(2):475–496.
- Shen, W., Gentry, R. J., and Tosi Jr, H. L. (2010). The impact of pay on CEO turnover: A test of two perspectives. *Journal of Business Research*, 63(7):729–734.
- Shleifer, A. and Vishny, R. W. (1989). Management entrenchment: The case of manager-specific investments. *Journal of Financial Economics*, 25(1):123–139.

- Skaperdas, S. (1996). Contest success functions. *Economic Theory*, 7(2):283–290.
- Tosi Jr, H. L. and Gomez-Mejia, L. R. (1989). The decoupling of CEO pay and performance: An agency theory perspective. *Administrative Science Quarterly*, pages 169–189.
- Tullock, G. (1980). *Efficient rent seeking in Toward a theory of the rent-seeking society* Rowley, Charles K and Tollison, Robert D and Tullock, Gordon, volume 1. Springer.

# Appendix

## A. Description of variables

Table A.1: List of variables

| Name            | Variable description                                            | Main characteristics                                                 |
|-----------------|-----------------------------------------------------------------|----------------------------------------------------------------------|
| $e_t^h$         | Effort level of actor $h$ at period $t$                         | Chosen by TMT members                                                |
| $q$             | Productivity of effort                                          | Equal for all TMT members                                            |
| $\varphi^h$     | A random variable affecting the productivity of actor $h$       | $\varphi^h \sim N(0, \sigma^2)$                                      |
| $\pi^h$         | First period performance of actor $h$                           | $\pi^h = qe_1^h + \varphi^h$                                         |
| $w_L$           | Leader's fixed salary                                           | Chosen by shareholders                                               |
| $\underline{w}$ | Leader's reservation salary                                     | Exogenous                                                            |
| $w_F$           | Follower's fixed salary                                         | Set by the CEO                                                       |
| $V_t$           | Firm value at period $t$                                        |                                                                      |
| $m$             | Proportion of gross firm value distributed to TMT members.      | Set by shareholders                                                  |
| $R$             | Gross revenues generated by each unit of effort.                | Exogenous                                                            |
| $p_{ih}$        | Probability of actor $i$ to win the contest against actor $h$ . | Tullock contest function<br>$p_{ih} = \frac{\pi_i}{(\pi_i + \pi_h)}$ |

## B. Proofs

**Proof of Lemma 1** At  $t=2$ , each actor's maximization problem can be written  $Max_{e_2^h} E(U_2^h) = w_h + \frac{m}{3} Rq(e_2^h + 2e_2^{-h}) - ke_2^h$ . The FOC are:  $\frac{\partial E(U_2^h)}{\partial e_2^h} = \frac{m}{3} Rq - k = 0$ . Because  $k \leq \frac{m}{3} Rq$ , the effort level will be set to 0.

**Proof of Proposition 1** The tournament is resolved by backward induction. First we look at the contest between the incumbent leader,  $L$  and the winner of the intra-follower tournament,  $F$ . From (6) and (7) we derive the FOC for the leader and the followers.

$$\frac{\partial E(U_1^L)}{\partial e_1^L} = \frac{e_1^F}{(e_1^F + e_1^L)^2} (w_L - \underline{w}) + \frac{m}{3} Rq - k = 0 \quad (\text{a.1})$$

$$\frac{\partial E(U_1^F)}{\partial e_1^F} = \frac{e_1^L}{(e_1^F + e_1^L)^2} \Delta w + \frac{m}{3} Rq - k = 0 \quad (\text{a.2})$$

Notice that, because we are considering the utility function of the follower who has won the intra-followers contest,  $p_{ij} = 1$ . Calculating  $\frac{(a.1)}{(a.2)}$  gives  $e_1^F = e_1^L \frac{\Delta w}{(w_L - \underline{w})}$ . If we replace this equality

in (a.1) and (a.2) we have  $e_1^L = \frac{\Delta w(w_L - \underline{w})}{(\Delta w + (w_L - \underline{w}))^2(k - \frac{m}{3}Rq)}(w_L - \underline{w})$  and  $e_1^F = \frac{\Delta w(w_L - \underline{w})}{(\Delta w + (w_L - \underline{w}))^2(k - \frac{m}{3}Rq)}\Delta w$ .

The next step is to show the symmetry between the two followers' effort choices at the first contest. Call  $\Omega = \text{Prob}(p_{ij} \geq p_{ji})$ . From (4) we know that  $\Omega$  will only depend on the difference between  $e_1^i$  and  $e_1^j$ . Then we can write each follower's FOCs as:  $\frac{\partial E(U_1^i)}{\partial e_1^i} = \frac{\partial \Omega(e_1^i - e_1^j)}{\partial e_1^i} + \frac{m}{3}Rq - k = 0$ ;  $\frac{\partial E(U_1^j)}{\partial e_1^j} = -\frac{\partial \Omega(e_1^i - e_1^j)}{\partial e_1^j} + \frac{m}{3}Rq - k = 0$ . Because  $\frac{\partial \Omega(e_1^i - e_1^j)}{\partial e_1^j} < 0$  we can see that both  $\frac{\partial \Omega(e_1^i - e_1^j)}{\partial e_1^i}$  and  $\frac{\partial \Omega(e_1^i - e_1^j)}{\partial e_1^j}$  equal  $k - \frac{m}{3}Rq$  so  $e_1^i = e_1^j = e_1^F$ .

**Proof of Proposition 2** When the leader is overconfident the first order condition of his maximization problem is:

$$\frac{\partial E(U_1^L)}{\partial e_1^L} = \frac{e_1^F}{(e_1^F + e_1^L)^2}(w_L - \underline{w}) + \frac{m}{3}Rq - (k - b) = 0 \quad (\text{a.3})$$

The FOC of the followers is as in (a.2). Computing  $\frac{(a.3)}{(a.2)}$  we can express  $e_1^F$  as  $e_1^F = e_1^L \frac{\Delta w(k - \frac{m}{3}Rq - b)}{(w_L - \underline{w})(k - \frac{m}{3}Rq)}$ . Replacing this equality in (a.3) and (a.2) reduces to:  $\widehat{e_1^L} = \frac{\Delta w(w_L - \underline{w})}{((w_L - \underline{w})(k - \frac{m}{3}Rq) + \Delta w(k - \frac{m}{3}Rq - b))^2}(w_L - \underline{w})$  and  $e_1^{F_{b>0}} = \frac{\Delta w(w_L - \underline{w})}{((w_L - \underline{w})(k - \frac{m}{3}Rq) + \Delta w(k - \frac{m}{3}Rq - b))^2}\Delta w$ . Equality between  $e_1^{i_{b>0}}$  and  $e_1^{j_{b>0}}$  can be proven in the same way as in Proof of Proposition 1.

**Proof of Corollary 1** To see whether the equilibrium effort levels are increasing in effort, we need to look at the following first order derivative  $\frac{\partial \widehat{e_1^L}}{\partial b} = \frac{(w_L - \underline{w})\Delta w^2(k - \frac{m}{3}Rq)}{((w_L - \underline{w})(k - \frac{m}{3}Rq) + \Delta w(k - \frac{m}{3}Rq - b))^3}$  which is always positive under A1. For the follower  $\frac{\partial e_1^{F_{b>0}}}{\partial b} = \frac{(w_L - \underline{w})\Delta w[\Delta w(k - \frac{m}{3}Rq - b) - (w_L - \underline{w})(k - \frac{m}{3}Rq)]}{((w_L - \underline{w})(k - \frac{m}{3}Rq) + \Delta w(k - \frac{m}{3}Rq - b))^3}$  which is positive if  $\Delta w(k - \frac{m}{3}Rq - b) > (w_L - \underline{w})(k - \frac{m}{3}Rq)$ , i.e.,  $b < \frac{\Delta w - (w_L - \underline{w})}{\Delta w}(k - \frac{m}{3}Rq)$ .

**Proof of Proposition 3** The leader will be willing to implement a tournament if his two periods expected utility in the tournament case is higher than the one in the no-tournament case,  $2w_L$ .

When the CEO is rational this condition can be written  $E(U_1^L) > 2w_L$ . Replacing for the equilibrium effort levels of Proposition 1 this condition reduces to  $-(w_L - \underline{w}) - \frac{(w_L - \underline{w})^2}{(w_L - \underline{w}) + \Delta w} + \frac{(w_L - \underline{w})\Delta w[2\frac{m}{3}Rq\Delta w - (k - \frac{m}{3}Rq)(w_L - \underline{w})]}{(w_L - \underline{w}) + \Delta w)^2(k - \frac{m}{3}Rq)} > 0$ .

Rearranging this expression gives:  $\frac{(w_L - \underline{w})\Delta w[2\frac{m}{3}Rq\Delta w - (k - \frac{m}{3}Rq)[2(w_L - \underline{w}) + \Delta w]]}{(w_L - \underline{w}) + \Delta w)^2(k - \frac{m}{3}Rq)} > 0$ .

Because  $[(w_L - \underline{w}) + \Delta w]^2(k - \frac{m}{3}Rq) > 0$  and  $(w_L - \underline{w})\Delta w > 0$ , the expression is positive iff  $2(w_L - \underline{w}) < \frac{\Delta w(3\frac{m}{3}Rq - k)}{(k - \frac{m}{3}Rq)}$ . The right hand side of this inequality is only positive when  $mRq > k$ .

The tournament prize that the rational CEO will choose for the followers will then be the one that maximizes the CEO's expected utility. The first order conditions of the maximization of

$E(U_1^L)$  with respect to  $\Delta w$  is  $\frac{\partial E(U_1^L)}{\Delta w} = \frac{2(w_L - \underline{w})^2(2\frac{m}{3}Rq\Delta w - (w_L - \underline{w})(k - \frac{m}{3}Rq))}{(w_L - \underline{w}) + \Delta w)^3(k - \frac{m}{3}Rq)} = 0$ . Because both the denominator and  $2(w_L - \underline{w})^2$  are strictly positive,  $\frac{\partial E(U_1^L)}{\Delta w} = 0$  iff  $2\frac{m}{3}Rq\Delta w - (w_L - \underline{w})(k - \frac{m}{3}Rq) = 0$ . Hence the equilibrium tournament prize equals  $\Delta w^* = \frac{(w_L - \underline{w})(k - \frac{m}{3}Rq)}{(2\frac{m}{3}Rq)}$ .

When the CEO is overconfident, he will accept a tournament promotion scheme if  $E(\widehat{U}_1^L) > 2w_L$ . Hence, we need to show the condition for  $-(w_L - \underline{w}) - \frac{(w_L - \underline{w})^2(k - \frac{m}{3}Rq)}{[(w_L - \underline{w})(k - \frac{m}{3}Rq) + \Delta w(k - \frac{m}{3}Rq - b)]} + \frac{(w_L - \underline{w})\Delta w[2\frac{m}{3}Rq\Delta w(k - \frac{m}{3}Rq - b) - (k - \frac{m}{3}Rq - b)(w_L - \underline{w})(k - \frac{m}{3}Rq)]}{[(w_L - \underline{w})(k - \frac{m}{3}Rq) + \Delta w(k - \frac{m}{3}Rq - b)]^2} > 0$ . Rearranging this expression reduces to the following condition for the leader to implement a tournament:  $\frac{2(w_L - \underline{w})(k - \frac{m}{3}Rq)}{(3\frac{m}{3}Rq - k - b)} > 0$ , i.e.,  $mRq > k - b$ .

To calculate the optimal prize at equilibrium we maximize  $E(\widehat{U}_1^L)$  with respect to  $\Delta w$ . The FOC are:  $\frac{\partial E(\widehat{U}_1^L)}{\partial \Delta w} = \frac{2(w_L - \underline{w})^2(k - \frac{m}{3}Rq)(k - \frac{m}{3}Rq - b)[2\frac{m}{3}Rq\Delta w - (w_L - \underline{w})(k - \frac{m}{3}Rq)]}{[(w_L - \underline{w})(k - \frac{m}{3}Rq) + \Delta w(k - \frac{m}{3}Rq - b)]^3} = 0$ . Because both the denominator and  $2(w_L - \underline{w})^2(k - \frac{m}{3}Rq)(k - \frac{m}{3}Rq - b)$  are strictly positive  $\frac{\partial E(\widehat{U}_1^L)}{\partial \Delta w} = 0$  iff  $2\frac{m}{3}Rq\Delta w - (w_L - \underline{w})(k - \frac{m}{3}Rq) = 0$ . Hence the equilibrium tournament prize set by the overconfident CEO is  $\Delta w^* = (w_L - \underline{w})\frac{(k - \frac{m}{3}Rq)}{(2\frac{m}{3}Rq)}$ . Notice that this equilibrium prize is: (i) equal to the one set by the rational CEO and (ii) independent of the level of CEO overconfidence,  $b$ .

**Proof of proposition 4** First we need to show that the overconfident CEO's objective utility is decreasing in the level of CEO overconfidence. The overconfident CEO's objective utility is as in equation (8a). The first order derivative of  $U_1^{L^{OC}}$  with respect to  $b$  is  $\frac{\partial U_1^{L^{OC}}}{\partial b} = \frac{-4(w_L - \underline{w})\frac{m}{3}Rqb}{(\frac{m}{3}Rq + k - b)^4} < 0$ .

Next, we compare the overconfident CEO's objective utility to the rational CEO's utility, which by replacing the effort levels from Proposition 1 and the equilibrium prize level from Proposition 3 can be written:  $U_1^{LR} = w_L + \underline{w} + \frac{2(w_L - \underline{w})\frac{m}{3}Rq}{(\frac{m}{3}Rq + k)}$ . Computing the difference between the two utilities reduces to:

$$U_1^{L^{OC}} - U_1^R = \left[ \frac{2(w_L - \underline{w})\frac{m}{3}Rq}{(\frac{m}{3}Rq + k - b)} - \frac{2(w_L - \underline{w})\frac{m}{3}Rqb}{(\frac{m}{3}Rq + k - b)^2} \right] - \frac{2(w_L - \underline{w})\frac{m}{3}Rq}{(\frac{m}{3}Rq + k)} = \frac{-2(w_L - \underline{w})\frac{m}{3}Rqb^2}{(\frac{m}{3}Rq + k)(\frac{m}{3}Rq + k - b)^2} < 0.$$

**Proof of Proposition 5** To prove that the shareholders will choose the minimal level of  $m$  that guaranties the implementation of a tournament, we need to show two things: (i) that the utility of shareholders when a tournament is implemented is negatively correlated with  $m$  and (ii) that shareholders prefer to be in the tournament case (assure  $mRq \geq k - b$ ). To show that when a tournament implementation is assured the shareholders will seek to minimize  $m$  we set  $Prob(mRq \geq k - b) = 1$  and calculate the first order derivative of  $(U^S | b)$  with respect

to  $m$ :  $\frac{\partial(U^S|b)}{\partial m} = \frac{-2(k-b)Rq(w_L-\underline{w})[(\frac{2-m}{3})Rq+k-b]}{(\frac{m}{3}Rq+k-b)^3} - \frac{3(w_L-\underline{w})k}{m^2Rq} < 0$ . Next, to show that it is always in the interest of shareholders to assure tournament implementation we need to compare the shareholders net revenues in the case of a tournament to the ones in the no tournament case normalized to zero in our model. To do this we set  $m = \frac{k-b}{Rq}$  and replace it in equation (9):  $E(U^S | b) = (1 - \frac{k-b}{Rq}) \frac{2(w_L-\underline{w})(k-b)Rq}{(\frac{k-b}{3}+k-b)^2} - 3w_L + \frac{(w_L-\underline{w})(k-\frac{k-b}{3})}{\frac{k-b}{Rq}} = \frac{9Rq-41(k-b)+24k}{8(k-b)}w_L - \frac{9Rq-17(k-b)+24k}{8(k-b)}\underline{w}$ . The latest equation is positive if  $w_L > \frac{9Rq-17(k-b)+24k}{9Rq-41(k-b)+24k}\underline{w}$ . Because the shareholders are the ones who set the prize for the leader they can always guarantee this inequality.

**Proof of Proposition 6** It follows directly from Proposition 3 that when  $mRq + b < k$ , i.e., when  $m < \frac{k-b}{Rq}$ , neither the overconfident nor the rational CEO implement a tournament so the shareholder's expected utility remains the same regardless of their choice of the CEO.

When,  $mRq < k < mRq + b$ , which corresponds to a stewardship level such that  $\frac{k-b}{Rq} \leq m < \frac{k}{R}q$ , a rational CEO does not implement a corporate tournament whereas an overconfident CEO does. From Assumption 1 and Proposition 2 we know that all actors provide more effort in the tournament case than in the no-tournament case. Shareholders expected utility is as in equation (9) and it is strictly positively correlated with the effort choices of all the TMT members. Hence shareholders strictly prefer a CEO who will implement a tournament, i.e., an overconfident CEO.

When  $k < mRq$ , i.e., for high levels of stewardship ( $m \geq \frac{k}{R}q$ ) the rational CEO is also willing to implement a corporate tournament. The shareholders expected utility when the CEO is rational, will be written:  $E(U^S | b = 0) = (1-m)q[\frac{(w_L-\underline{w})^2\Delta w + 2(w_L-\underline{w})w^2}{((w_L-\underline{w})+\Delta w)^2(k-\frac{m}{3}Rq)}]R - w_L - 2w_F$  when the CEO is rational and  $E(U^S | b > 0) = (1-m)q[\frac{(w_L-\underline{w})^2\Delta w(k-\frac{m}{3}Rq) + 2(w_L-\underline{w})\Delta w^2(k-\frac{m}{3}Rq-b)}{((w_L-\underline{w})(k-\frac{m}{3}Rq) + \Delta w(k-\frac{m}{3}Rq-b))^2}]R - w_L - 2w_F$  when the CEO is overconfident. Replacing for the optimal tournament prize in both equations, we can easily show that  $E(U^S | b > 0) - E(U^S | b = 0) = \frac{2(w_L-\underline{w})(k-b)}{(\frac{m}{3}Rq+k-b)^2} - \frac{2(w_L-\underline{w})k}{(\frac{m}{3}Rq+k)^2} > 0$  as long as  $b < \frac{k^2 - (\frac{m}{3}Rq)^2}{k}$ .

# IV. Self-efficacy vs. Confidence in Opportunity Outcomes: Which type of entrepreneurial confidence fosters venture emergence?<sup>\*</sup>

*Not doubt, but certainty, drives men mad.*

-Friedrich Wilhelm Nietzsche

## 1 Introduction

Entrepreneurs as a group are often portrayed as incorrigible optimists. They tend to be more confident in their abilities, future outcomes and knowledge than other economic agents (Busenitz, 1999; Cooper et al., 1988). These findings have nurtured academic debates on the consequences of entrepreneurial (over)confidence on venture performance. A major question relates to the “optimal” intensity of entrepreneurial confidence: although minimal self-confidence seems necessary for new venture creation, it is often argued that too much confidence – that is, overconfidence - adversely affects venture survival (Hayward et al., 2006). A less debated question concerns the nature of entrepreneurial confidence and how different types of confidence affect venture performance. Because new venture success depends on the quality of both the entrepreneur and the entrepreneurial opportunity, entrepreneurial actions should result from a complex process of decision making wherein entrepreneurs evaluate the intrinsic quality of their business ideas and their abilities to implement these ideas (McMullen and Shepherd, 2006). Accordingly, the decision to launch a new venture is likely to be based on confidence in one’s ability to perform

---

<sup>\*</sup>This article was written in collaboration with Professor Laurent Vilanova.

The authors would like to thank the participants at the XXVI Rent Conference and the 33rd Babson College Entrepreneurship Research Conference (BCERC) for helpful comments and suggestions.

the tasks relevant to entrepreneurship (entrepreneurial self-efficacy)(Cassar and Friedman, 2009), confidence in the quality of the opportunity (Dimov, 2010), and confidence in future outcomes (Townsend et al., 2010). How these types of confidence articulate and affect (separately or jointly) venture emergence is nevertheless still an open question.

The main objective of this article is to determine whether two types of entrepreneurial confidence, entrepreneurial self-efficacy (ESE) and confidence in opportunity outcomes, have distinct or similar effects on the probability of venture emergence. Our conceptual framework starts from the premise that nascent entrepreneurs perceive two kinds of uncertainty during the startup process: uncertainty about their general ability to start a business and uncertainty about the chances of success for the opportunity they are pursuing. Because confident beliefs have been shown to influence entrepreneurial intentions (Krueger Jr et al., 2000) and venture emergence (Dimov, 2010), we examine how these two types of entrepreneurial confidence affect both nascent entrepreneurs' initial motivation and the odds of venture emergence. The key distinction between this study and related studies are our conjectures - which are based on the hubris literature (e.g., Hayward et al. (2006)), the unrealistic optimism literature (e.g.,Armor and Taylor (1998)), and disappointment theory (e.g., Zeelenberg et al. (2000)) - that (i) ESE and confidence in opportunity outcomes affect venture emergence in opposite ways, and (ii) the conjunction of high ESE and high confidence in opportunity outcomes reduces the motivational benefits of both constructs.

The specificities of the startup process are crucial to understanding how nascent entrepreneurs' confident beliefs affect the odds of venture emergence. This process is typically a multi-dimensional and multi-step game wherein nascent entrepreneurs accumulate various activities and receive interim feedback on their actions and judgments. At each step, they may revise their initial beliefs and decide to quit the process. In this complex and dynamic game, venture emergence requires intense and persistent motivation from these nascent entrepreneurs and the ability to continuously adapt their actions and efforts

to a wide range of unanticipated obstacles.

In this context, it is questionable whether nascent entrepreneurs' self-efficacy and confidence in opportunity outcomes have similar or opposite effects. Prior research generally assumes that confident beliefs, whatever their nature, have positive effects on venture emergence. For example, Dimov (2010) assumes that nascent entrepreneurs' opportunity feasibility and startup self-efficacy beliefs are components of a single general construct, opportunity confidence, which enhances the odds of venture emergence. Self-efficacy theory, which is highly influential within the entrepreneurship field, posits that ability and outcome expectancies influence human motivation and action in the same direction, but that self-efficacy is a more important predictor of behavior (Bandura, 1986). Consistent with this theory, ESE has been found to positively affect entrepreneurial intentions, motivation and venture performance (e.g., Cassar and Friedman (2009); Chen et al. (1998)). Importantly, recent findings show that both types of expectancies positively affect venture emergence but that outcome expectancies have only a marginal role (Townsend et al., 2010). Other lines of research nevertheless suggest that confidence in opportunity outcomes might have a less marginal and less positive role in the process of venture emergence. Nascent entrepreneurs often overestimate the probability of their venture becoming operational (Cassar, 2010), and these inflated outcome expectancies are likely to be a primary determinant of excess entry (Camerer and Lovo, 1999). According to hubris theory, the extreme certainty of success might lead these entrepreneurs to underestimate the resources and the effort needed to make their venture operational (Hayward et al., 2010).

In order to provide further insight into why ESE and confidence in opportunity outcomes might have distinct effects on venture emergence, the second objective of this study is to examine the motivational effects of these two types of confidence. It is commonly assumed that individuals who rate high in self-efficacy tend to invest more effort in task execution than individuals with lower self-efficacy (Bandura, 1982; Locke et al., 1984). Confidence in opportunity outcomes presumably has the same effect, as expectancy theo-

ries argue that the stronger the belief in a positive task outcome, the stronger the person's involvement in executing that task (Armor and Taylor, 1998). The relationships between the different types of entrepreneurial confidence, the nascent entrepreneur's motivation, and venture emergence might nevertheless be more complex than suggested by social cognitive and expectancy theories.

Even though ESE and confidence in opportunity outcomes are likely to increase nascent entrepreneurs' intended effort at the first stages of the startup process - that is, their initial motivation - a key question is whether these two types of confidence have the same enduring effects on motivation. Whereas the persistent motivational effects of ESE are widely acknowledged, the long-term motivational consequences of confidence in opportunity outcomes are more difficult to discern. For example, it has been noted that high outcome expectancies can lead to disappointment and long-term disengagement in the face of adversity (Armor and Taylor, 1998). If the motivation conveyed by confidence in opportunity outcomes is more fragile and less persistent than that conveyed by ESE, it is therefore possible that nascent entrepreneurs' initial motivation has different mediating effects on the following relationships: ESE-venture emergence and confidence in opportunity outcomes-venture emergence.

Another open question concerns how the two types of confidence interact in shaping initial motivation. More specifically, does high confidence in opportunity outcomes enhance or weaken the positive effect of ESE on initial motivation? Prior research has demonstrated a negative interaction effect between perceptions of feasibility and perceptions of desirability in forming entrepreneurial intentions (Fitzsimmons and Douglas, 2011). Less is known, however, about the interaction effect of different types of feasibility perceptions, like ESE, and confidence in opportunity outcomes.

In order to clarify the effects of these two types of entrepreneurial confidence, our study proceeds as follows. First, we draw on the entrepreneurship literature (e.g., Dimov

(2010); McMullen and Shepherd (2006); Townsend et al. (2010)) and the psychological literature (e.g., Armor and Taylor (1998); Bandura (1977); Zeelenberg et al. (2000)) to introduce the distinction between ESE and confidence in opportunity outcomes. We then propose hypotheses that relate these two types of entrepreneurial confidence to the nascent entrepreneur's motivation and the odds of venture emergence. Next, we present the data, methodology and statistical procedures that are used to test the hypotheses. We then report our results. Last, we discuss the implications for research and practice before concluding.

## **2 Theoretical development**

### **2.1 Different types of entrepreneurial confidence: ESE vs. confidence in opportunity outcomes**

Several typologies of entrepreneurial beliefs have been proposed in recent years. Some authors contrast entrepreneurs' confidence in their abilities and their confidence in the opportunity they are pursuing (Mitchell and Shepherd, 2010). In line with expectancy theory, others propose a distinction between entrepreneurs' ability expectancies and outcome expectancies (Townsend et al., 2010). These efforts to better understand entrepreneurial cognition are particularly important as entrepreneurs' beliefs about their own capabilities and the chances of success for their project are likely to have a direct influence on their propensity to act in uncertain environments (McMullen and Shepherd, 2006). From this perspective, a key question is whether different types of beliefs have similar or distinct effects on entrepreneurial motivation, actions and performance. Before proceeding to the treatment of this complex question, we briefly discuss the two types of beliefs that will be studied here. Entrepreneurial self-efficacy refers to the belief in one's capabilities to accomplish the tasks relevant to entrepreneurship (Cassar and Friedman, 2009). Prior research has found a significant association between ESE and entrepreneurial intentions (Chen et al., 1998; Zhao et al., 2005) and between ESE and venture performance (Baum and Locke, 2004; Hmieleski and Baron, 2008). This central role of ESE is not surprising

as entrepreneurs often operate in uncertain environments and need to overcome difficult obstacles, a context in which high confidence in one's own abilities proves necessary to sustain effort persistence (Bandura and Locke, 2003). While various measures have been proposed, there is strong consensus that ESE is domain-specific, which means that it differs from other psychological constructs that consider personal beliefs about one's overall capabilities (e.g., general self-efficacy, dispositional optimism). ESE is not considered to be venture-specific, however, but rather it "should apply to all entrepreneurial activity regardless of idiosyncratic factors related to each unique venture" (Cassar and Friedman (2009), p. 243).

Although self-efficacy theory assumes that self-efficacy is a key determinant of human behavior, it also acknowledges the influence of other types of personal beliefs. Outcome expectancies, defined as "a person's estimate that a given behavior will lead to certain outcomes" (Bandura (1977), p.193), are also expected to influence human behavior. From this perspective, people should consider both their perceived ability to perform a behavior X (self-efficacy) and their estimate of the future outcomes Y that flow from behavior X (outcome expectancies) before making a decision. Although some empirical studies use the same measures for ESE and outcome expectancies (Renko et al., 2012), these two constructs have distinguishing features. First, outcome expectancies are by nature venture-specific, as they depend on entrepreneurs' perceptions about the quality of their opportunity and environment (customers, suppliers, competitors, etc.). Second, ESE refers to perceptions of one's personal ability to perform entrepreneurial tasks and is thus person-centered, whereas outcome expectancies pertain to perceptions of the odds of a successful venture, a probability that depends not only on one's personal capabilities but also on external factors (e.g., project quality, market competition).

The idea that nascent entrepreneurs' decisions do not depend solely on ESE is also implicit in the literature on the relative roles of entrepreneurial capabilities - the quality of the "jockey" - and the project - the quality of the "horse" - in new venture perfor-

mance (Kaplan et al., 2009). When assessing the chances of success for their venturing efforts, nascent entrepreneurs’ confidence in the quality of the opportunity should matter (Dimov, 2010). This confidence reflects the nascent entrepreneur’s subjective beliefs about the quality of a business like his/hers, a belief that may result from an evaluation of the intrinsic components of the project (e.g., its level of technical innovation) and the characteristics of the environment (customers, competitors).

We capture nascent entrepreneurs’ views on the chances of success for the opportunity they are pursuing using a new construct: confidence in opportunity outcomes. This construct has two basic components. The first is the “third-person opportunity evaluation” (McMullen and Shepherd, 2006), in which entrepreneurs estimate the feasibility, interest and scope of the opportunity they seek to exploit. In other words, this component is a thorough evaluation of a project based on objective information, data and studies, as well as intuition, flair, gut feeling and any other factor influencing the assessment of the opportunity.

The second component is predictive and refers to the subjective assessment of the odds of venture emergence. Obviously, this subjective estimation might not be totally independent of what the entrepreneurs believe about their entrepreneurial abilities, that is, their entrepreneurial self-efficacy. In line with the idea that self-efficacy beliefs influence outcome expectancies (e.g., Bandura (1977)), it is presumable that individuals with higher self-efficacy should, on average, perceive greater chances of success when pursuing an opportunity. Still, these two types of confidence may be dissociated. For example, a nascent entrepreneur may be highly confident in opportunity outcomes because he/she “falls in love with an idea” and, hence, is more focused on the newness of the project than on personal entrepreneurial abilities (Baron and Ensley, 2006).

In sum, the starting point of our paper is the assumption that nascent entrepreneurs’ beliefs that they possess the skills and abilities to start a business (a person-specific ex-

pectancy) are distinct from their beliefs that the opportunity they pursue will be successful (a venture- and environment-specific expectancy).

## **2.2 ESE vs. confidence in opportunity outcomes: Effects on venture emergence**

ESE has long been considered a key determinant in the development of entrepreneurial cognition and behavior (Boyd and Vozikis, 1994). Field studies have confirmed this positive role by demonstrating that ESE is positively associated with entrepreneurial intentions (Chen et al., 1998; De Noble et al., 1999), startup emergence (Cassar and Friedman, 2009; Townsend et al., 2010), and venture growth (Baum and Locke, 2004; Hmieleski and Baron, 2008). However, relatively little effort has been made to identify the precise channels through which ESE affects venture performance. Social cognitive theorists generally assume that individuals high in self-efficacy reach higher levels of performance because they set more challenging goals and show greater persistence in achieving their goals (Bandura and Locke, 2003). Accordingly, Cassar and Friedman (2009) found that individuals with high ESE are more involved in nascent entrepreneurship, as they devote a greater proportion of their wealth and more time per week to venturing activities.

The apparent consensus on the positive role of ESE should not, however, obfuscate recent debates about the actual performance effects of self-efficacy. For example, some applied psychologists have raised the question of reverse causality – that is, that one’s self-efficacy might be a consequence rather than a cause of performance - and have argued that the positive effect of self-efficacy on performance may simply indicate that the individuals with the highest perceived ability are also the most capable (Vancouver and Kendall, 2006; Vancouver et al., 2008). These issues are of particular importance in the case of nascent entrepreneurs who might develop high ESE because of the previous feedback they received from entrepreneurial experiences (Gatewood et al., 2002; Forbes, 2005; Zhao et al., 2005). That said, recent studies addressing the reverse causality problem have confirmed the positive effect of ESE on venture emergence (Cassar and Friedman, 2009).

Based on these findings - and regardless of whether these individuals set more ambitious goals, show greater persistence in achieving their goals, or make better decisions - we hypothesize that nascent entrepreneurs who are more confident in their abilities are more likely to successfully emerge from the venture process than those lower in ESE.

**Hypothesis 1** *Entrepreneurial self-efficacy has a positive effect on the probability of venture emergence.*

Although social cognitive theory considers self-efficacy and outcome expectancies as two distinct constructs (Bandura, 1977), most empirical studies have focused on the performance effects of self-efficacy, with only a few investigating the relative performance effects of the two constructs (Williams, 2010). Although earlier studies found distinct effects (e.g., Maddux et al. (1986)), it is generally assumed that outcome expectancies have either no independent effects on behavior or have the same effect as self-efficacy. For example, Bandura (1989) argued that outcome expectancies do not have an independent effect on behavior in situations where outcomes completely depend on the level of competence. Conversely, he assumed that an independent (and positive) effect would be observed “when extraneous factors also affect outcomes” (Bandura (1989), p.1180). Because the entrepreneur’s level of competence is hardly the sole determinant of new venture performance, this suggests that a nascent entrepreneur’s outcome expectancies should have a positive effect on the probability of venture emergence. In parallel, recent research in entrepreneurship has underlined the positive role of opportunity confidence in the formation of entrepreneurial action and new venture emergence (Dimov, 2010; McMullen and Shepherd, 2006). All in all, this body of literature suggests that nascent entrepreneurs who are highly confident in the quality of their opportunity and who estimate that environmental conditions are favorable – that is, those with high confidence in opportunity outcomes - are more likely to start new operative firms.

Alternatively, recent work in various fields (e.g., economics, entrepreneurship) has demonstrated that entrepreneurs tend to overestimate the chances of success for their ventures and hold inflated beliefs about future outcomes (Camerer and Lovallo, 1999;

Hayward et al., 2006; Landier and Thesmar, 2009; Cassar, 2010). These optimistic beliefs should be particularly prevalent among nascent entrepreneurs, as these individuals operate in highly uncertain and complex environments, two contextual characteristics that favor the formation of upward biased expectations (Kahneman et al., 1982). According to Armor and Taylor (1998), there are at least two reasons why positive outcome expectations might negatively affect ex post performance. First, unconfirmed forecasts or discrepancies between the expected and actual outcomes for a given task can provoke the negative affective state of disappointment (Markman et al., 2005; Van Dijk et al., 2003). Moreover, disappointment has been found to be stronger when the outcome is surprising or when the individual was initially quite certain about his/her forecasts (Coughlan and Connolly, 2001). Second, this belief may lead to inappropriate or potentially inefficient actions. In line with this idea, hubris theories of entrepreneurship suggest that entrepreneurs who are highly confident in future outcomes might not take the necessary precautions or might inappropriately endow their resources during the startup process (Hayward et al., 2006). During the venture creation process, nascent entrepreneurs' overestimation of the quality of their projects might lead them to underestimate the resource needs of their ventures or the intensity of competition. Consistent with this idea is the finding that a substantial fraction of entrepreneurs attribute a minor role to external factors in their venturing decisions (Moore et al., 2007). This suggests that entrepreneurs tend to neglect competition and underestimate environmental uncertainty. Because nascent entrepreneurs are in intense competition with one another and with established firms to attract customers and key providers of resources, those who initially underestimate the intensity of rivalry might have difficulty in attracting resources and proceeding through the different stages of the venture creation process. All of this suggests that the performance effects of confidence in opportunity outcomes might be quite different from the performance effects of ESE.

**Hypothesis 2** *Confidence in opportunity outcomes has a negative effect on the probability of venture emergence.*

## **2.3 ESE vs. confidence in opportunity outcomes: Effects on motivation**

The idea that ESE is a critical antecedent of entrepreneurial intentions was initially advanced by Boyd and Vozikis (1994) and has since been widely confirmed. Accordingly, several studies have found that ESE is positively related to the intention to set up one's own business (Chen et al., 1998; Krueger Jr et al., 2000; Zhao et al., 2005) and that ability expectancies positively affect nascent entrepreneurs' initial motivation, that is, their intended effort to make the startup operational (Renko et al., 2012). Although less is known about its motivational effects, prior research suggests that confidence in opportunity outcomes increases entrepreneurial motivation. In line with previous research on expectancy theory, Bandura (1989) argued that self-efficacy and outcome expectancies shape intentions in the same direction. In the specific context of entrepreneurship, McMullen and Shepherd (2006) theorized that the formation of entrepreneurial intentions presupposes a third-person opportunity belief (a conviction that one has recognized a promising market space independently of one's own abilities to exploit it). Therefore, the certainty that their opportunities will be successful in the future should provide nascent entrepreneurs with strong incentives to devote effort to the various startup tasks, a stimulating effect that accounts for the "bright side" of positive outcome expectancies (Armor and Taylor, 1998).

Even though ESE and confidence in opportunity outcomes increase nascent entrepreneurs' intended efforts in the first stages of the startup process, this initial motivation might be insufficient to make the venture operational. Attaining operational status is not a one-shot game and nascent entrepreneurs must show persistent motivation in dealing with the inevitable obstacles that arise during the startup process. There is broad consensus that self-efficacy beliefs have an enduring effect on motivation since they "determine how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences" (Bandura (1977), p.194). Therefore, initial motivation should positively mediate the relationship between ESE and venture emergence.

Less is known about whether confidence in opportunity outcomes has a temporary or persistent effect on motivation. One view is that high initial outcome expectancies, while boosting short-term motivation, lead to disappointment and disengagement in the long term when people are confronted with tasks that prove more difficult than anticipated (Armor and Taylor, 1998). Because going through the startup process is a daunting task with many obstacles, this view suggests that the initial motivation of nascent entrepreneurs who are highly confident in opportunity outcomes might vanish quickly and might, hence, fail to mediate the relationship between confidence in opportunity outcomes and venture emergence. A second thesis is that one's confidence in opportunity outcomes has long-lasting effects on motivation. In favor of this view is the finding that people with high initial outcome expectancies tend to maintain their predictions (and their effort) even when faced with disconfirming evidence (Buehler et al., 1994). Although the debate is still open, the finding that nascent entrepreneurs' initial motivation is positively related to venture emergence (Renko et al., 2012), coupled with our previous conjecture that confidence in opportunity outcomes increases initial motivation, prompts us to hypothesize that initial motivation positively mediates the relationship between confidence in opportunity outcomes and venture emergence.<sup>1</sup>

**Hypothesis 3.a** *Initial motivation positively mediates the impact of entrepreneurial self-efficacy on venture emergence.*

**Hypothesis 3.b** *Initial motivation positively mediates the impact of confidence in opportunity outcomes on venture emergence.*

Prior research has shown that perceptions of feasibility and perceptions of desirability interact in the formation of entrepreneurial intentions. Accordingly, Fitzsimmons and Douglas (2011) found that perceived desirability has a less pronounced positive effect on entrepreneurial intentions for those entrepreneurs with high (rather than low) perceived

---

<sup>1</sup>The hypothesis that confidence in opportunity outcomes positively affects venture emergence through initial motivation (H3b below) does not contradict our previous conjecture that confidence in opportunity outcomes has a negative effect on venture emergence (H2). Rather, this suggests that other mediating variables (apart from initial motivation) render high confidence in opportunity outcomes detrimental to venture emergence (e.g., insufficient resource endowments and/or decision-making errors) and offset the positive path associated with initial motivation.

feasibility (ESE). To illustrate their results, they presented the example of a scientist expressing the low perceived desirability of entrepreneurship, who might nevertheless form high entrepreneurial intentions if he/she possesses high perceived feasibility (e.g., believing he/she has discovered a new technology).

The “scientist” example suggests that perceptions of feasibility - that is, ESE and confidence in opportunity outcomes - might also interact in shaping initial motivation. Scientists who lack startup experience and, hence, exhibit low confidence in their ability to perform the various tasks relevant to entrepreneurship (low ESE) might still develop strong entrepreneurial intentions if they are highly confident in the technical and market potential of their project (high confidence in opportunity outcomes). Therefore, nascent entrepreneurs might be highly motivated to make their ventures operational as long as either perceptions of ESE or perceptions of confidence in opportunity outcomes are above some threshold value.

Interestingly, the idea of a negative interaction effect between ESE and confidence in opportunity outcomes finds some indirect support in previous research on overconfidence. For example, Hmieleski and Baron (2008) showed that entrepreneurs in dynamic environments who are high in both self-efficacy and dispositional optimism are less successful than those with high self-efficacy and moderate optimism. Their interpretation was that the combination of high self-efficacy and high dispositional optimism might generate overconfidence. Coupled with the idea that overconfidence might lead entrepreneurs to underestimate the efforts needed to complete their projects (De Noble et al., 1999; Hayward et al., 2006), this finding suggests that the conjunction of high ESE and high confidence in opportunity outcomes might adversely affect nascent entrepreneurs’ initial motivation.

**Hypothesis 4** *ESE and confidence in opportunity outcomes interact negatively in the formation of initial motivation, such that higher confidence in opportunity outcomes reduces the positive effect of ESE on nascent entrepreneurs’ initial motivation.*

## 3 Methodology

### 3.1 Sample

We use the Panel Study of Entrepreneurial Dynamics I (PSED I) to investigate the effects of ESE and confidence in opportunity outcomes on entrepreneurial motivation and venture emergence. This dataset, which has been widely used in the entrepreneurship literature (see Reynolds and Curtin (2007), for an extensive review) presents several advantages. First, the PSED is free of survivorship and recall biases since the interviewed “would-be” entrepreneurs have been identified by random screening of 64,622 individuals in the US. A sample of 1164 people who answered “yes” to the question “*Are you, alone or with others, trying to start a new business?*” and then “no” to the question “*Is this effort part of your job assignment?*” was selected and further screened in order to isolate nascent entrepreneurs from infant businesses (i.e., startups with a positive monthly cash flow that has already covered expenses and owners’ salaries for more than three months). This screening procedure resulted in a sample of 830 individuals who were initially interviewed by phone (562 of them also completed a mail questionnaire that included some of the questions used in this paper). All the respondents were contacted again in three subsequent waves of interviews, on average 14, 33 and 55 months after the initial screening wave. Of this original sample, we excluded individuals who had been in the planning or the startup activity process for more than two years and who were thus more advanced in the procedures related to venture creation (Eckhardt et al., 2006). After screening, we had a sample of 292 entrepreneurs for our analysis. Descriptive statistics of the sample are provided in Table 1. The industry distribution (also presented in Table 1) was not significantly different from that of the entire sample of nascent entrepreneurs ( $\chi^2 = 3.39$  (8 df),  $p > 0.90$ ).

### 3.2 Dependent variables

We measured venture emergence through the reported status change in the startup attempt from the second to the last wave of interviews. At each periodic interview,

the nascent entrepreneurs were asked to classify the current status of their venture (an operating business, an inactive startup, an active startup or an abandoned project) and to indicate the time of change in status. Based on their answers, we constructed a dummy variable equal to one if the startup became an operating business between two interviews. This time-dependent dummy accounts for the duration of the process of switching from non-operational (any of the three other statuses indicated above) to operational status. Of course, this variable is right-censored because startup attempts that had not yet become operating businesses at the time of the observation might have become so afterwards. We alleviated the concern of right-censoring by using survival models in our empirical estimations.

The nascent entrepreneurs' initial motivation was measured using the following Likert scale statement: "*There is no limit as to how long I would give maximum effort to establish my business*" (from 1: Completely untrue to 5: Completely true).<sup>2</sup>

### 3.3 Independent variables

Entrepreneurial self-efficacy was measured by asking the respondents to indicate their position (on a 5-point Likert scale) regarding the following statements: (i) *If I work hard I can successfully start a business*; (ii) *Starting a business is much more desirable than any other career opportunities I have*; (iii) *If I start a business it will help me achieve other important goals in my life*; (iv) *Overall, my skills and abilities will help me start a business*; (v) *My past experience will be very valuable in starting a business*; and (vi) *I am confident I can put in the effort needed to start a business*. This six-item measure of ESE includes both feasibility and desirability components. Previous research using the PSED I data proposed either the six-item measure (Dimov, 2010; Gatewood et al., 2002) or a more restricted four-item measure containing only the feasibility elements,

---

<sup>2</sup>This specific question from the PSED I mail questionnaire has been applied differently in previous research. Renko et al. (2012) included it in a two-item scale of the measure of "intended effort." Likewise, this question was part of a four-item (Liao and Welsch, 2004) and a three-item (Manolova et al., 2008) scale of "entrepreneurial intensity" – the extent to which the entrepreneur is focused on or committed to his/her startup endeavor. In our study, we employ this item as a measure of 'initial motivation'; i.e., the feedback-free, unconditional willingness to provide effort expressed by the nascent entrepreneur at the beginning of the startup activities.

that is, items (i), (iv), (v) and (vi) (Cassar and Friedman, 2009). We chose the extended six-item measure because of its stronger internal consistency (Cronbach’s alpha = 0.79 versus 0.73 for the 4-item scale). Confidence in opportunity outcomes was measured using the following 11-item question (Cronbach’s alpha = 0.82): *Considering the economic and community context for the new firm, how certain are you that the new business will be able to accomplish the following: (i) Obtain raw materials; (ii) Attract employees; (iii) Obtain startup capital; (iv) Obtain working capital; (v) Deal with distributors; (vi) Attract customers; (vii) Compete with other firms; (viii) Comply with local, state, and federal regulations; (ix) Keep up with technological advances; (x) Obtain a bank’s help; and (xi) Obtain venture capital’s help.* This PSED I questionnaire entry was originally conceived to measure Perceived Environmental Uncertainty (Liao and Gartner, 2006; Matthew and Human, 2004). In parallel, Dimov (2010) employed this question as a proxy for the nascent entrepreneur’s sentiment about the practicability of a given opportunity in a two-piece construct called “Opportunity Feasibility Belief.” These prior interpretations underline two specific facets of this 11-item measure that closely match our construct of confidence in opportunity outcomes. First, it captures the entrepreneur’s confidence that the business opportunity is good enough to be implemented properly and meets the well-known milestones of the startup process. Second, it also captures the entrepreneur’s estimation of the opportunity’s robustness with regard to environmental changes, legal requirements, competition dynamics and other external success factors. For these reasons, we believe that nascent entrepreneurs’ certainty about the achievability of their opportunity in the current environment provides a good evaluation of their confidence in opportunity outcomes.<sup>3</sup>

---

<sup>3</sup>A question about our measure of confidence in opportunity outcomes is its connection with the entrepreneurs themselves and their perceived abilities (i.e., ESE). Unlike Townsend et al. (2010), we cannot argue that this measure is “entrepreneur-free” as it does not concern the entrepreneur’s evaluation of a business like his/hers but rather an assessment of his/her own business opportunity. However, we believe that the formulation of the question, in particular the encouragement to consider the environmental and community context, induces a more external view of the opportunity than that captured by ESE. Subsequent tests of the correlation between the two measures confirmed this intuition.

Table 1: Correlation matrix and summary statistics

|                                  | Mean     | Std. Dev. | 1        | 2                          | 3        | 4       | 5         |
|----------------------------------|----------|-----------|----------|----------------------------|----------|---------|-----------|
| 1. ESE                           | 4.27     | 0.66      |          |                            |          |         |           |
| 2. COO                           | 5.29     | 1.89      | 0.159*** |                            |          |         |           |
| 3. Age                           | 36.7     | 13.5      | 0.035    | -0.133**                   |          |         |           |
| 4. College                       | 0.36     | 0.24      | -0.011   | -0.015                     | -0.029   |         |           |
| 5. Female                        | 0.54     | 0.50      | -0.039   | -0.206***                  | 0.090*   | -0.037  |           |
| 6. Startup Experience            | 0.90     | 1.53      | 0.012    | 0.072                      | 0.142**  | -0.008  | -0.127*   |
| 7. Industry Experience           | 8.42     | 11.3      | 0.119    | -0.007                     | 0.286*** | -0.043  | 0.079     |
| 8. Parents Entrepreneurs         | 0.51     | 0.50      | 0.128**  | -0.034                     | -0.024   | -0.022  | 0.114**   |
| 9. Household Wealth              | 10.1     | 2.99      | -0.042   | -0.112*                    | 0.218*** | 0.133** | -0.035    |
| 10. Risk Preference              | 0.49     | 0.15      | 0.183*** | 0.164***                   | -0.019   | 0.021   | -0.216*** |
| 11. Product Dev. Completed       | 0.39     | 0.49      | -0.114** | -0.212***                  | 0.103**  | 0.016   | 0.101**   |
| 12. Prepared Business plan       | 0.64     | 0.48      | 0.174*** | 0.087                      | 0.001    | 0.088*  | 0.042     |
| 13. Prepared Fin. Projection     | 0.57     | 0.50      | 0.086    | 0.076                      | 0.064    | 0.064   | -0.023    |
|                                  | 6        | 7         | 8        | 9                          | 10       | 11      | 12        |
| 7. Industry Experience           | 0.138*   |           |          |                            |          |         |           |
| 8. Parents Entrepreneurs         | 0.194*** | 0.048     |          |                            |          |         |           |
| 9. Household Wealth              | 0.131    | 0.125     | 0.059    |                            |          |         |           |
| 10. Risk Preference              | 0.074    | 0.05      | -0.072   | 0.107*                     |          |         |           |
| 11. Product Dev. Completed       | -0.016   | -0.039    | 0.134*** | 0.127**                    | -0.103   |         |           |
| 12. Prepared Business plan       | 0.096    | -0.026    | 0.052    | 0.147**                    | 0.054    | -0.025  |           |
| 13. Prepared Fin. Projection     | 0.199*** | 0.016     | 0.067    | 0.109**                    | 0.008    | 0.145** | 0.317**   |
| Industries                       |          |           |          |                            |          |         |           |
| Agriculture, Forest, Fish        |          | 3%        |          | Wholesale                  |          |         | 3%        |
| Mining                           |          | 0%        |          | Retail                     |          |         | 26%       |
| Construction                     |          | 4%        |          | Business Services          |          |         | 31%       |
| Manufacturing                    |          | 6%        |          | Consumer Services          |          |         | 13%       |
| Transportation, Comm., Utilities |          | 3%        |          | Health, Educ., Gov. Sector |          |         | 8%        |

Notes. Pairwise correlations are presented. N=292. Sig.\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .10$ .

### 3.4 Control variables

Prior research has shown that the outcome of the startup process depends on the nascent entrepreneur’s human, social and financial capital, as well as demographics. Following Cassar and Friedman (2009), we controlled for several socio-demographic characteristics of our respondents, such as age (continuous), gender (a dummy variable equal to one if the nascent entrepreneur was female), and education (a dummy variable named college and equal to one if the entrepreneur had a college or higher degree of education). The entrepreneur’s human capital was controlled for by startup experience (the number of previously created businesses) and industry experience (the number of years of experience in the specific industry). Financial capital was measured by the household’s total wealth at the time of the first interview and social capital by a dummy variable equal to one if the entrepreneur’s parents were self-employed. We also controlled for the entrepreneur’s risk preference measured as the average score from three questions: (i) whether the respondent preferred a business with little risk of failure and little likelihood of making him/her a millionaire or the opposite scenario, (ii) perceived importance of the possibility of obtaining information about the chances of going bankrupt when evaluating business opportunities, and (iii) the extent to which the respondent enjoyed the challenge of risky situations.

Following Delmar and Shane (2004) and Cassar (2010), we also included characteristics of the startup process that have been identified as good predictors of venture emergence. The developmental stage of the product was measured by a dummy variable equal to one if the entrepreneur indicated that the product or service they would be selling was “*Completed and ready for sale or delivery.*” Moreover, two other dummy variables were added: one for a business plan if it had been prepared and one for financial projections of any kind having been made. The basic summary statistics and pairwise correlations among all control variables are presented in Table 1.

## 4 Results

Before turning to the results relevant to the major hypotheses, we first examine the descriptive statistics and correlations of the study variables. Table 1 shows a moderately positive, significant correlation between ESE and confidence in opportunity outcomes (COO) (Pearson correlation coefficient of 0.16 significant at the 1% level). We also computed the Spearman correlation and found a correlation coefficient of 0.18 (significant at the 1% level). This supports our initial assumption that ESE and COO are distinct beliefs that do not necessarily emerge in the same individual.

The hypotheses relating to the effects of ESE and COO were tested in several steps. The first step consisted of testing the direct effect of each type of confidence on the probability of venture emergence. Since the variable measuring venture emergence is right-censored, we used a survival model that takes into consideration the duration of the status switch, that is, the time it takes for the venture to emerge. Table 2 presents the results of a Weibull regression. We chose this parameterization for the basic hazard rate for two reasons. First, the Akaike information criterion (Akaike, 1974) indicates that the Weibull model provides a better statistical fit to our data than either an exponential semi-parametric model or a Cox proportional regression. Second, the Weibull distribution is suitable for modeling data with monotone hazard rates that increase or decrease with time. This allowed us to control directly for the influence of venture age on the hazard rates.<sup>4</sup>

The survival models presented in Table 2 fit 95 cases of venture emergence out of 292 individual startup processes. Consistent with Hypothesis 1, ESE increases the probability of venture emergence (a one-unit increase in ESE increases the hazard of venture emergence by 41% in Model 1 and 186% in Model 2). In contrast, COO has a negative effect

---

<sup>4</sup>For the sake of brevity, we do not report here the results obtained with alternative parameterizations for the basic hazard rates. Note, however, that the major results presented in Table 2 do not change significantly with these alternative specifications. Regression results and the specific values of the Akaike information criterion for these alternative specifications are available in Appendix.

Table 2: Weibull regression models to predict the effects of ESE and confidence in opportunity outcomes on the transition to venture emergence

|                    | Model 1          |        | Model 2       |        | Model 3                              |        |
|--------------------|------------------|--------|---------------|--------|--------------------------------------|--------|
|                    | without Controls |        | with Controls |        | with Controls and Initial Motivation |        |
|                    | Hazard ratios    | S. D.  | Hazard ratios | S.D.   | Hazard ratios                        | S.D.   |
| ESE                | 1,41**           | (0,22) | 2,86**        | (1,38) | 2,03                                 | (1,03) |
| COO                | 0,80*            | (0,09) | 0,66*         | (0,16) | 0,57**                               | (0,15) |
| Age                |                  |        | 0,99          | (0,01) | 1,00                                 | (0,01) |
| College            |                  |        | 0,00          | (0,00) | 0,00                                 | (0,00) |
| Female             |                  |        | 0,41**        | (0,18) | 0,32                                 | (0,15) |
| Startup Exp.       |                  |        | 0,99          | (0,11) | 0,99                                 | (0,10) |
| Industry Exp.      |                  |        | 0,99          | (0,02) | 0,97                                 | (0,01) |
| Parents ENs        |                  |        | 1,57          | (0,71) | 1,77                                 | (0,79) |
| Household Wealth   |                  |        | 1,15*         | (0,10) | 1,17                                 | (0,10) |
| Risk Preference    |                  |        | 1,05          | (0,44) | 1,05                                 | (0,45) |
| Product Dev.Comp.  |                  |        | 2,35**        | (1,02) | 2,21                                 | (0,97) |
| Prepared Bus.Plan  |                  |        | 1,44          | (0,69) | 1,52                                 | (0,73) |
| Prepared Fin.Proj. |                  |        | 1,32          | (0,61) | 1,51**                               | (0,71) |
| Initial Motivation |                  |        |               |        | 1,47**                               | (0,32) |
| Log Likelihood     | -51,68           |        | -12,74        |        | -11,03                               |        |
| Prob>Chi-square    | 0,03             |        | 0,04          |        | 0,02                                 |        |

*Notes.* N=292. Standard errors are in brackets. Sig. \*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .10$ . All models fit a semi-parametric survival model with a Weibull distribution. Hazard ratios are reported so coefficients greater than 1 reflect a positive relationship between the independent variable and the probability of the business becoming operational and coefficients smaller than 1 reflect a negative relationship.

on the probability of attaining operational status (a one-unit increase in COO cuts the hazard to 80% of its previous value in Model 1 and reduces the hazard rate of venture emergence by 34% in Model 2). Thus, these results corroborate our hypotheses that ESE and COO have opposite direct effects on the probability of venture emergence.

The second step of our analysis consisted of testing the indirect effects of ESE and COO. Hypotheses 3a and 3b proposed that entrepreneurs' initial motivation would mediate the effects of ESE and COO on the probability of venture emergence. According to Baron and Kenny (1986), three conditions must be satisfied to infer mediation. First, the independent (mediated) variable (here, ESE or COO) must affect the mediator (here, initial motivation). Second, the mediator must affect the dependent variable (here, the probability of venture emergence). Third, the effect of the independent variable on the dependent variable is zero or reduced when the mediator is controlled.

Model 3 of Table 2 lets us examine the second and third conditions of mediation. This model shows a significant positive effect of initial motivation on the hazard of venture emergence (hazard rate of 1.47,  $p < 0.05$ ), which confirms the second condition. Introducing initial motivation into the basic regression significantly reduces the impact of ESE on venture emergence but has no impact on the effect of COO. Hence, the third condition for establishing the mediation of initial motivation is confirmed for the ESE-venture emergence relationship, but is ruled out for COO-venture emergence. According to Baron and Kenny, this indicates that initial motivation does not mediate the relationship between confidence in opportunity outcomes and venture emergence, that is, H3b is disconfirmed. Conversely, the second and third conditions for establishing an indirect effect of ESE on venture emergence are confirmed. We are therefore one step away from corroborating Hypothesis 3a: we only need to confirm that ESE (the independent variable) affects initial motivation (the mediator).

Table 3 reveals the results of multinomial logistic regression to test the relationship between the independent variables (ESE and COO) and initial motivation. As apparent in Models 1 and 2, there is a strong and significant positive relationship between ESE and initial motivation. Therefore, Baron and Kenny's first condition holds for the ESE-venture emergence relationship, which confirms that initial motivation mediates the effect of ESE on venture emergence (Hypothesis 3a is supported).

Recently, several methodologists have disputed the procedures of Baron and Kenny (1986) by pointing out the need to cross-validate mediation through formal tests of the significance of the indirect effect (Preacher and Hayes, 2004; Zhao et al., 2010). We tested the significance of the mediation effects using bootstrap analysis, as proposed by Preacher and Hayes (2004). Technically, we used the PROCESS moderated mediation specification for SPSS developed by (Preacher et al., 2007) and (Hayes, 2012). The results of this analysis are provided in Table 4. Panel A of Table 4 confirms the significance of the indirect effect of ESE on venture emergence (H3a is confirmed) and indicates that 34%

Table 3: Multinomial logistic regressions to predict the effects of ESE and confidence in opportunity outcomes on initial motivation

|                    | Model 1          |        | Model 2       |        |
|--------------------|------------------|--------|---------------|--------|
|                    | without Controls |        | with Controls |        |
|                    | Coef.            | S.D.   | Coef.         | S.D.   |
| ESE                | 2,33***          | (0,55) | 2,58***       | (0,94) |
| COO                | 1,05***          | (0,41) | 2,39*         | (1,52) |
| ESE*COO            | -0,21**          | (0,09) | -0,43*        | (0,35) |
| Age                |                  |        | 0,00          | (0,01) |
| College            |                  |        | 1,95*         | (1,10) |
| Female             |                  |        | 0,54          | (0,38) |
| Startup Exp.       |                  |        | -0,14         | (0,10) |
| Industry Exp.      |                  |        | 0,02          | (0,01) |
| Parents ENs        |                  |        | 0,01          | (0,01) |
| Household Wealth   |                  |        | -0,32         | (0,36) |
| Risk Preference    |                  |        | 0,00*         | (0,10) |
| Product Dev.Comp.  |                  |        | 0,74          | (0,40) |
| Prepared Bus.Plan  |                  |        | -0,11         | (0,36) |
| Prepared Fin.Proj. |                  |        | -0,07         | (0,35) |
| Log Likelihood     | - 363,90         |        | -153,98       |        |
| Pro>Chi-square     | 0,03             |        | 0,01          |        |

*Notes.* N=292. Odds-ratios of a multinomial logistic regression are reported. Standard errors are in brackets. Sig.\*\*\* $p < .01$ ,\*\* $p < .05$ ,\* $p < .10$ .

of this effect is conveyed by initial motivation. The results presented in Panel B confirm the rejection of Hypothesis 3b about the indirect effect of COO on venture emergence.<sup>5</sup> The last step of our analysis consisted of testing Hypothesis 4, which predicted a negative interaction effect between ESE and COO on initial motivation. We tested this hypothesis in two ways. First, we tested the effect of an interaction variable (ESE\*COO) on initial motivation. Table 3 shows that this interaction variable has a significant negative effect on initial motivation, in both Model 1 (Coef=-0.21,  $p < 0.05$ ) and Model 2 (Coef.=-0.43,  $p < 0.10$ ). To evaluate the magnitude of the interaction effect, we also regressed initial motivation on ESE at three levels of COO (the mean level and one standard deviation below and above the mean). Panel C of Table 4 presents the results of these regressions. Consistent with H4, we found a significant drop in the effect of ESE on initial motivation over the increasing levels of COO. Figure 1 plots the relationship between ESE and initial

<sup>5</sup>The rejection of Hypothesis 3b follows from the fact that the confidence interval of the bootstrap analysis ( $n=10,000$ ) for the indirect effect of confidence in opportunity outcomes on venture emergence includes the value of zero, which reveals a null indirect effect of this variable.

Table 4: Analysis of moderated mediation

| Model                                                             | Coef.  | SE    | p     | CI(low) | CI(up) |
|-------------------------------------------------------------------|--------|-------|-------|---------|--------|
| Panel A: MEDIATION: ESEc → Initial Motivation → Venture Emergence |        |       |       |         |        |
| Direct Effect                                                     | 0,312  | 0,242 | 0,197 | 0,16    | 0,79   |
| Indirect Effect                                                   | 0,165  | 0,098 |       | 0,01    | 0,39   |
| Proportion of total effect mediated                               | 0,345  |       |       |         |        |
| Ratio of indirect to direct effect                                | 0,527  |       |       |         |        |
| Panel B: MEDIATION: COO → Initial Motivation → Venture Emergence  |        |       |       |         |        |
| Direct Effect                                                     | -0,097 | 0,072 | 0,237 | 0,04    | 0,18   |
| Indirect Effect                                                   | 0,040  | 0,109 |       | -0,01   | 0,09   |
| Proportion of total effect mediated                               |        |       |       |         |        |
| Ratio of indirect to direct effect                                |        |       |       |         |        |
| Panel C: MODERATION: ESE*COO → Initial Motivation                 |        |       |       |         |        |
| Effect of ESE Low COO                                             | 0,759  | 0,129 | 0,000 | 0,50    | 10,1   |
| Effect of ESE Mean COO                                            | 0,542  | 0,086 | 0,000 | 0,37    | 0,71   |
| Effect of ESE High COO                                            | 0,325  | 0,108 | 0,003 | 0,11    | 0,54   |

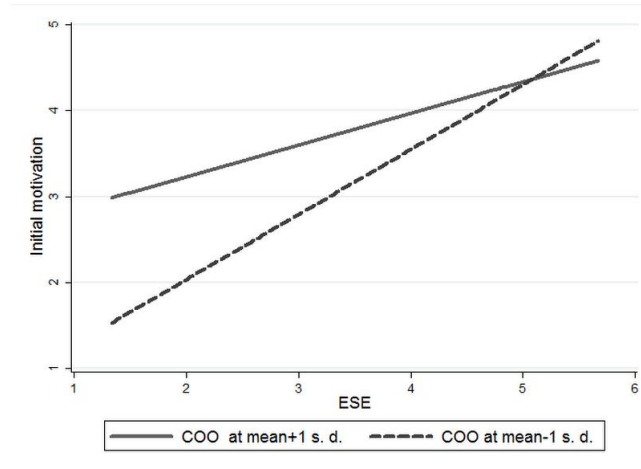
*Notes.* The model is estimated with Hayes's (2012) PROCESS code. All regressions are logistic regressions. Confidence intervals result from 10,000 bootstrap samples. Controls are included in all the regressions. COO is for confidence in opportunity outcomes. Low/High COO corresponds to Mean COO minus/plus one standard deviation.

motivation for the low (mean minus one standard deviation) and high (mean plus one standard deviation) levels of COO, in order to illustrate the slope difference between the two cases. Overall, these two methodologies confirm the negative interaction effect of ESE and COO on initial motivation, providing support for Hypothesis 4.<sup>6</sup>

In sum, our empirical analysis provides support for Hypotheses 1 and 2, which assumed opposite direct effects of ESE and COO on the probability of venture emergence. Our results also confirm that (i) entrepreneurs' initial motivation mediates the relationship between ESE and the probability of venture emergence (consistent with Hypothesis 3a) and (ii) ESE and COO interact negatively on nascent entrepreneurs' initial motivation (consistent with Hypothesis 4).

<sup>6</sup>Although it was not hypothesized in our theoretical development, we also checked for an interaction effect of ESE and COO on the probability of venture emergence. The results of this test failed to support this interaction effect and for the sake of brevity we do not report them here.

Figure 1: Interaction effect of ESE and confidence in opportunity outcomes on initial motivation



Notes. The lines present linear regressions of initial motivation on ESE at a low level of confidence in opportunity outcomes (mean minus one standard deviation) and at a high level of confidence in opportunity outcomes (mean plus one standard deviation).

## 5 Discussion and implications

### 5.1 Theoretical implications

Recent research in entrepreneurship and related fields (e.g., economics, management and psychology) has questioned the view that positive expectancy beliefs (either domain-specific such as self-efficacy or more general like dispositional optimism) always increase one's motivation and always lead to higher performance. The idea that highly confident beliefs could be “too much of a good thing” in certain circumstances has found some support in the findings that self-efficacy is negatively related to motivation at the within-person level of analysis (Vancouver and Kendall, 2006) and that the combination of high ESE and high dispositional optimism has a negative effect on firm performance in dynamic environments (Hmieleski and Baron, 2008). The merit of these studies has been to reactivate the debate on how the level and nature of entrepreneurial confidence influence an entrepreneur's motivation and venture performance.

With regard to this debate, the main contribution of our paper is to show that two distinct types of entrepreneurial confidence (ESE and confidence in opportunity outcomes) have opposite effects on the probability of venture emergence. In this regard, our paper

differs from existing research that has either (i) focused on a single type of confident belief – that is, either ESE (Cassar, 2010) or a general measure of opportunity confidence (Dimov, 2010), or (ii) found that ESE is the only type of confident belief that affects the odds of venture emergence (Townsend et al., 2010). More generally, our finding that ESE is a positive predictor of venture emergence, whereas confidence in opportunity outcomes reduces the odds, suggests that, beyond intensity, the nature of entrepreneurial confidence also matters.

The negative performance effect of confidence in opportunity outcomes might naturally be interpreted within the framework of hubris theory. It has long been suggested that many entrepreneurs are overconfident, and overconfidence can produce a host of negative consequences, such as the propensity to overinvest (Hayward and Hambrick, 1997), underestimate the resource needs of ventures (Hayward et al., 2006), and/or underestimate the adversity of the competitive environment (Camerer and Lovallo, 1999; Moore and Cain, 2007). Nascent entrepreneurs who are highly confident in opportunity outcomes might suffer from the same symptoms. <sup>7</sup>In favor of this thesis is the observation that our measure of confidence in opportunity outcomes has been used as a (inverse) measure of nascent entrepreneurs' perceived environmental uncertainty (Liao and Gartner, 2006; Gartner and Liao, 2012). A possible interpretation for the negative effect of confidence in opportunity outcomes is therefore that nascent entrepreneurs who perceive low environmental uncertainty are less likely to overcome the obstacles of the venture creation process and that insufficient attention to external factors (e.g., the competitive environment) might be a major source of failure in venture emergence.

The adverse effect of confidence in opportunity outcomes on venture emergence might also be related to the literature on disappointment, which is defined as an emotional state due to unmet expectations or unexpected obstacles. There is wide consensus that

---

<sup>7</sup>The postulated positive association between confidence in opportunity outcomes and overconfidence finds some support in the finding that confidence in opportunity outcomes is more pronounced among young and male nascent entrepreneurs (see Table 1), two demographic characteristics that are well-known antecedents of overconfidence (Barber and Odean, 2001; Forbes, 2005).

disappointment stems from - and is proportional to - the difference between what an individual expected and what he/she got (Bell, 1985; Van Dijk and van der Pligt, 1997). This suggests that the feeling of disappointment should be more deeply experienced by entrepreneurs who initially overestimated their venture's future outcomes, that is, who exhibited optimistic overconfidence (Simon and Shrader, 2012).

There is little doubt that the context of the venture creation process, with its host of unexpected and difficult obstacles, is favorable to the development of disappointment in entrepreneurs with initial high confidence in opportunity outcomes. When disappointment intervenes in the course of the venture emergence process, such as when the nascent entrepreneur observes the discrepancy between interim outcomes and predicted outcomes, it may result in feelings of powerlessness, a tendency to do nothing, and the reluctance to make decisions (Zeelenberg et al., 2000). In sum, this perspective suggests that confidence in opportunity outcomes negatively affects venture emergence because it paves the way for feelings of disappointment, which then weaken the nascent entrepreneur's subsequent motivation. An interesting corollary to this interpretation is that confidence in opportunity outcomes and ESE may have distinct motivational effects over the course of the venture creation process. Whereas the initial motivation conveyed by ESE is likely to persist over time and difficulties, the initial motivation conveyed by confidence in opportunity outcomes may be more fragile and less persistent. Notably, this conjecture fits well with our finding that initial motivation mediates the relationship between ESE and venture emergence, but does not mediate the relationship between confidence in opportunity outcomes and venture emergence.

## **5.2 Implications for practice**

Our finding that different types of confident beliefs have distinct motivational and performance effects has important implications for practitioners. A direct implication is that all types of entrepreneurial confidence do not equally facilitate venture emergence and that, in this respect, there are good (ESE) and bad types of confident beliefs (confidence

in opportunity outcomes). At the most practical level, training and education should reinforce nascent entrepreneurs' confidence in their entrepreneurial abilities while moderating their enthusiasm about the potential of their opportunities. Because high confidence in opportunity outcomes might result from the tendency of novice entrepreneurs to focus on the "novelty" or "uniqueness" of their opportunities (Baron and Ensley, 2006), measures could be taken to orient their attention toward market and financial factors that more directly affect venture emergence. Training programs should particularly guide nascent entrepreneurs toward a more thorough analysis of their competitive and market environment, as entrepreneurs with high confidence in opportunity outcomes tend to perceive low environmental uncertainty, a perception that often stems from insufficient attention to external factors (Moore et al., 2007). Last, because disappointment has more pronounced effects for unexpected (negative) outcomes (Van Dijk et al., 2003), individuals with high confidence in opportunity outcomes should be informed about the various negative events that are typically encountered in the venture creation process.

Another important practical implication of our paper concerns the desirability of strong initial motivation in nascent entrepreneurs. Although initial motivation has been promoted as a key determinant of venture emergence (Renko et al., 2012), questioning the antecedents of this initial motivation seems crucial. Particular attention should be paid to screening out those entrepreneurs with strong but temporary motivation (because of initial high confidence in opportunity outcomes) and who therefore present low chances of success. This suggests that investors, entrepreneurship program designers and even entrepreneurs themselves should pay attention not only to the intensity of initial motivation, but also to the origins of this motivation.

### **5.3 Limitations and future research directions**

Before concluding, several limitations of the present paper should be noted. The main limitation concerns our difficulty in disentangling the exact reasons for the negative effect of confidence in opportunity outcomes on venture emergence, based on the PSED data.

As explained above, there are several potential factors suggested by hubris theory and disappointment theory that might explain this negative effect. Future research should aim to clarify whether this negative effect has motivational origins (e.g., confidence in opportunity outcomes favors subsequent disappointment and reduced motivation) and/or behavioral reasons (e.g., confidence in opportunity outcomes leads entrepreneurs to take inefficient actions). Accordingly, an interesting research direction would be to examine the dynamics of a nascent entrepreneur's motivation throughout the venture creation process and to check whether the shape of the motivational trajectory differs according to the type of confident beliefs that were at the origin of the individual's engagement in entrepreneurship (ESE or confidence in opportunity outcomes).

Another limitation, which is also a promising avenue of research, is the impossibility of determining from our results whether the factors that promote venture emergence, like entrepreneurial self-efficacy, or that hinder venture emergence, like confidence in opportunity outcomes, are desirable or not. Implicit in the entrepreneurship literature is the idea that actions that promote venture emergence are desirable at both the macroeconomic and the microeconomic levels. According to this view, actions that increase entrepreneurial self-efficacy and that decrease confidence in opportunity outcomes should be desirable. Still, new ventures often fail after a few months or years and more venture emergence can foster excess entry (Camerer and Lovo, 1999). In this alternative view, actions that reduce self-efficacy and/or that increase confidence in opportunity outcomes might be desirable. Future research should examine this problem by considering a venture's long-term performance and in particular its post-emergence survival.

## 6 Conclusion

It has been argued elsewhere that (i) confidence in one's entrepreneurial ability is a more robust predictor of startup success than outcome expectancies (Townsend et al., 2010) and (ii) venture capitalists should rely more on the quality of the entrepreneurial opportunity (the horse) than the entrepreneur's human capital (the jockey) (Kaplan et al.,

2009). The results of our study enrich this debate by demonstrating that the jockey's confidence in his/her entrepreneurial abilities (i.e., perceived self-efficacy) and confidence in his/her chance of winning the race (i.e., confidence in opportunity outcomes) have distinct consequences. More specifically, we show that nascent entrepreneurs' initial confidence in their abilities increases the probability of venture emergence, whereas their confidence in the chances of success for the opportunity they are pursuing decreases this probability. We also show that these two types of confidence positively affect nascent entrepreneurs' initial motivation to exert effort but interact negatively in shaping the effort that they intend to put into the startup process. Overall, this suggests that both the intensity and nature of entrepreneurial confidence matter for venture emergence.

## References

- Akaike, H. (1974). A new look at the statistical model identification. *Transactions on Automatic Control, IEEE*, 19(6):716–723.
- Armor, D. A. and Taylor, S. E. (1998). Situated optimism: Specific outcome expectancies and self-regulation. *Advances in Experimental Social Psychology*, 30:309–379.
- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review*, 84(2):191–215.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2):122–147.
- Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology*, 4(3):359–373.
- Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist*, 44(9):1175–1184.
- Bandura, A. and Locke, E. A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology*, 88(1):87–99.
- Barber, B. M. and Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *Quarterly Journal of Economics*, pages 261–292.
- Baron, R. A. and Ensley, M. D. (2006). Opportunity recognition as the detection of meaningful patterns: Evidence from comparisons of novice and experienced entrepreneurs. *Management Science*, 52(9):1331–1344.
- Baron, R. M. and Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6):1173–1182.
- Baum, J. R. and Locke, E. A. (2004). The relationship of entrepreneurial traits, skill, and

- motivation to subsequent venture growth. *Journal of Applied Psychology*, 89(4):587–598.
- Bell, D. E. (1985). Disappointment in decision making under uncertainty. *Operations Research*, 33(1):1–27.
- Boyd, N. G. and Vozikis, G. S. (1994). The influence of self-efficacy on the development of entrepreneurial intentions and actions. *Entrepreneurship Theory and Practice*, 18:63–77.
- Buehler, R., Griffin, D., and Ross, M. (1994). Exploring the “planning fallacy”: Why people underestimate their task completion times. *Journal of Personality and Social Psychology*, 67(3):366–381.
- Busenitz, L. W. (1999). Entrepreneurial risk and strategic decision making it’s a matter of perspective. *The Journal of Applied Behavioral Science*, 35(3):325–340.
- Camerer, C. and Lovallo, D. (1999). Overconfidence and excess entry: An experimental approach. *American Economic Review*, pages 306–318.
- Cassar, G. (2010). Are individuals entering self-employment overly optimistic? an empirical test of plans and projections on nascent entrepreneur expectations. *Strategic Management Journal*, 31(8):822–840.
- Cassar, G. and Friedman, H. (2009). Does self-efficacy affect entrepreneurial investment? *Strategic Entrepreneurship Journal*, 3(3):241–260.
- Chen, C. C., Greene, P. G., and Crick, A. (1998). Does entrepreneurial self-efficacy distinguish entrepreneurs from managers? *Journal of Business Venturing*, 13(4):295–316.
- Cooper, A. C., Woo, C. Y., and Dunkelberg, W. C. (1988). Entrepreneurs’ perceived chances for success. *Journal of Business Venturing*, 3(2):97–108.
- Coughlan, R. and Connolly, T. (2001). Predicting affective responses to unexpected outcomes. *Organizational Behavior and Human Decision Processes*, 85(2):211–225.

- De la Rosa, L. E. (2011). Overconfidence and moral hazard. *Games and Economic Behavior*, 73(2):429–451.
- De Noble, A. F., Jung, D., and Ehrlich, S. B. (1999). Entrepreneurial self-efficacy: The development of a measure and its relationship to entrepreneurial action. *Frontiers of Entrepreneurship Research*, 1999:73–87.
- Delmar, F. and Shane, S. (2004). Legitimizing first: Organizing activities and the survival of new ventures. *Journal of Business Venturing*, 19(3):385–410.
- Dimov, D. (2010). Nascent entrepreneurs and venture emergence: Opportunity confidence, human capital, and early planning. *Journal of Management Studies*, 47(6):1123–1153.
- Eckhardt, J. T., Shane, S., and Delmar, F. (2006). Multistage selection and the financing of new ventures. *Management Science*, 52(2):220–232.
- Fitzsimmons, J. R. and Douglas, E. J. (2011). Interaction between feasibility and desirability in the formation of entrepreneurial intentions. *Journal of Business Venturing*, 26(4):431–440.
- Forbes, D. P. (2005). Are some entrepreneurs more overconfident than others? *Journal of Business Venturing*, 20(5):623–640.
- Gartner, W. and Liao, J. (2012). The effects of perceptions of risk, environmental uncertainty, and growth aspirations on new venture creation success. *Small Business Economics*, 39(3):703–712.
- Gatewood, E. J., Shaver, K. G., Powers, J. B., and Gartner, W. B. (2002). Entrepreneurial expectancy, task effort, and performance. *Entrepreneurship Theory and Practice*, 27(2):187–206.
- Hayes, A. F. (2012). Process: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling. *Manuscript submitted for publication*.

- Hayward, M. L., Forster, W. R., Sarasvathy, S. D., and Fredrickson, B. L. (2010). Beyond hubris: How highly confident entrepreneurs rebound to venture again. *Journal of Business Venturing*, 25(6):569–578.
- Hayward, M. L. and Hambrick, D. C. (1997). Explaining the premiums paid for large acquisitions: Evidence of CEO hubris. *Administrative Science Quarterly*, pages 103–127.
- Hayward, M. L., Shepherd, D. A., and Griffin, D. (2006). A hubris theory of entrepreneurship. *Management Science*, 52(2):160–172.
- Hmieleski, K. M. and Baron, R. A. (2008). When does entrepreneurial self-efficacy enhance versus reduce firm performance? *Strategic Entrepreneurship Journal*, 2(1):57–72.
- Kahneman, D., Tversky, A., and Slovic, P. (1982). Judgment under uncertainty: Heuristics and biases. *Cambridge University Press*.
- Kaplan, S. N., Sensoy, B. A., and Strömberg, P. (2009). Should investors bet on the jockey or the horse? evidence from the evolution of firms from early business plans to public companies. *The Journal of Finance*, 64(1):75–115.
- Krueger Jr, N. F., Reilly, M. D., and Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, 15(5):411–432.
- Landier, A. and Thesmar, D. (2009). Financial contracting with optimistic entrepreneurs. *Review of Financial Studies*, 22(1):117–150.
- Liao, J. and Gartner, W. B. (2006). The effects of pre-venture plan timing and perceived environmental uncertainty on the persistence of emerging firms. *Small Business Economics*, 27(1):23–40.
- Liao, J. and Welsch, H. (2004). Entrepreneurial intensity. *Handbook of Entrepreneurial Dynamics: The Process of Business Creation*, pages 186–195.
- Locke, E. A., Frederick, E., Lee, C., and Bobko, P. (1984). Effect of self-efficacy, goals, and task strategies on task performance. *Journal of Applied Psychology*, 69(2):241–251.

- Maddux, J. E., Norton, L. W., and Stoltenberg, C. D. (1986). Self-efficacy expectancy, outcome expectancy, and outcome value: relative effects on behavioral intentions. *Journal of Personality and Social Psychology*, 51(4):783–789.
- Manolova, T. S., Brush, C. G., and Edelman, L. F. (2008). What do women entrepreneurs want? *Strategic Change*, 17(3-4):69–82.
- Markman, G. D., Baron, R. A., and Balkin, D. B. (2005). Are perseverance and self-efficacy costless? Assessing entrepreneurs’ regretful thinking. *Journal of Organizational Behavior*, 26(1):1–19.
- Matthew, C. and Human, S. (2004). The economic and community context for entrepreneurship: Perceived environmental uncertainty. *Handbook of Entrepreneurial Dynamics, Thousand Oaks, CA: Sage Publications*, pages 421–429.
- McMullen, J. S. and Shepherd, D. A. (2006). Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Academy of Management Review*, 31(1):132–152.
- Mitchell, J. R. and Shepherd, D. A. (2010). To thine own self be true: Images of self, images of opportunity, and entrepreneurial action. *Journal of Business Venturing*, 25(1):138–154.
- Moore, D. A. and Cain, D. M. (2007). Overconfidence and underconfidence: When and why people underestimate (and overestimate) the competition. *Organizational Behavior and Human Decision Processes*, 103(2):197–213.
- Moore, D. A., Oesch, J. M., and Zietsma, C. (2007). What competition? Myopic self-focus in market-entry decisions. *Organization Science*, 18(3):440–454.
- Preacher, K. J. and Hayes, A. F. (2004). Spss and sas procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, 36(4):717–731.

- Preacher, K. J., Rucker, D. D., and Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research*, 42(1):185–227.
- Renko, M., Kroeck, K. G., and Bullough, A. (2012). Expectancy theory and nascent entrepreneurship. *Small Business Economics*, 39(3):667–684.
- Reynolds, P. D. and Curtin, R. T. (2007). *Business creation in the United States: Panel study of entrepreneurial dynamics II initial assessment*. Now Publishers Inc.
- Simon, M. and Shrader, R. C. (2012). Entrepreneurial actions and optimistic overconfidence: The role of motivated reasoning in new product introductions. *Journal of Business Venturing*, 27(3):291–309.
- Townsend, D. M., Busenitz, L. W., and Arthurs, J. D. (2010). To start or not to start: Outcome and ability expectations in the decision to start a new venture. *Journal of Business Venturing*, 25(2):192–202.
- Van Dijk, W. W. and van der Pligt, J. (1997). The impact of probability and magnitude of outcome on disappointment and elation. *Organizational Behavior and Human Decision Processes*, 69(3):277–284.
- Van Dijk, W. W., Zeelenberg, M., and Van der Pligt, J. (2003). Blessed are those who expect nothing: Lowering expectations as a way of avoiding disappointment. *Journal of Economic Psychology*, 24(4):505–516.
- Vancouver, J. B. and Kendall, L. N. (2006). When self-efficacy negatively relates to motivation and performance in a learning context. *Journal of Applied Psychology*, 91(5):1146–1153.
- Vancouver, J. B., More, K. M., and Yoder, R. J. (2008). Self-efficacy and resource allocation: support for a nonmonotonic, discontinuous model. *Journal of Applied Psychology*, 93(1):35–47.

- Williams, D. M. (2010). Outcome expectancy and self-efficacy: Theoretical implications of an unresolved contradiction. *Personality and Social Psychology Review*.
- Zeelenberg, M., Van Dijk, W. W., Manstead, A. S., and vanr de Pligt, J. (2000). On bad decisions and disconfirmed expectancies: The psychology of regret and disappointment. *Cognition & Emotion*, 14(4):521–541.
- Zhao, H., Seibert, S. E., and Hills, G. E. (2005). The mediating role of self-efficacy in the development of entrepreneurial intentions. *Journal of Applied Psychology*, 90(6):1265–1272.
- Zhao, X., Lynch, J. G., and Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, 37(2):197–206.

# Appendix

## A. Description of variables

Table A.1: List of variables

| Variable name                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Time |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Entrepreneurial Self-Efficacy (ESE)      | Mean value of 6 Likert scale questions:<br>(i) If I work hard I can successfully start a business;<br>(ii) Starting a business is much more desirable than any other career opportunities I have;<br>(iii) If I start a business it will help me achieve other important goals in my life;<br>(iv) Overall, my skills and abilities will help me start a business;<br>(v) My past experience will be valuable in starting a business;<br>(vi) I am confident I can put in the effort needed to start a business. | TI   |
| Confidence in Opportunity Outcomes (COO) | Mean value of 11 Likert-scale questions: Considering the economic and community context for the new firm, how certain are you that the new business will be able to a.Obtain raw materials; b.Attract employees; c.Obtain startup capital; d.Obtain working capital; e.Deal with distributors; f.Attract customers; g.Compete with other firms; h.Comply with regulations. k.Keep up with technological advances; i.Obtain a bank's help; j.Obtain venture capital's help.                                       | TI   |
| Age                                      | The entrepreneur's age at the first wave of interview.                                                                                                                                                                                                                                                                                                                                                                                                                                                           | TI   |
| College                                  | A dummy variable equal to 1 if the Entrepreneur has a college degree.                                                                                                                                                                                                                                                                                                                                                                                                                                            | TI   |
| Female                                   | A dummy variable equal to 1 if the Entrepreneur is a women.                                                                                                                                                                                                                                                                                                                                                                                                                                                      | TI   |
| Startup Experience                       | A dummy variable equal to 1 when the entrepreneur has created at least one venture before this specific start-up effort.                                                                                                                                                                                                                                                                                                                                                                                         | TI   |
| Industry Experience                      | The number of years of work experience in the industry in which the venture is created.                                                                                                                                                                                                                                                                                                                                                                                                                          | TI   |
| Parents Entrepreneurs                    | A dummy variable equal to 1 if at least one of the parents of the Entrepreneur was an entrepreneur himself.                                                                                                                                                                                                                                                                                                                                                                                                      | TI   |
| Household Wealth                         | A log of the household wealth as reported by the Entrepreneur.                                                                                                                                                                                                                                                                                                                                                                                                                                                   | TI   |
| Risk Preference                          | A 3-items scale:(i) Which venture would you prefer? 1.A profit of 5M\$  20% chance of success; 2.A profit of 2M\$  50% chance of success; 3.A profit of 1.25M\$  80% chance of success;(ii)If you could obtain more information to make a choice between two businesses how important would be the information on the chances of going bankrupt for each. (iii)How accurately would the following statements describe you? "I enjoy the challenge of situations that many consider "risky"".                     |      |
| Product Development Completed            | A dummy variable equal to one if the Entrepreneur declares the product as completed and ready for sale or delivery.                                                                                                                                                                                                                                                                                                                                                                                              | TV   |
| Prepared Business Plan                   | A dummy variable equal to one if the Entrepreneur declares having prepared a business plan                                                                                                                                                                                                                                                                                                                                                                                                                       | TV   |
| Prepared Financial Projections           | A dummy variable equal to one if the Entrepreneur declares having made financial projections                                                                                                                                                                                                                                                                                                                                                                                                                     | TV   |
| Initial Motivation                       | A Likert Scale statement: There is no limit as to how long I would give maximum effort to establish my business.                                                                                                                                                                                                                                                                                                                                                                                                 | TI   |
| Venture emergence                        | A dummy variable equal to 1 if startup became an operational business during the previous period.                                                                                                                                                                                                                                                                                                                                                                                                                | TV   |

Notes.TI = time invariant; TV = time variant. All time invariant variables are measured at the first period.

## B. Robustness checks

Table A.2: Alternative survival models

|                    | Weibull regression |        | Exponential regression |        | Cox regression |        |
|--------------------|--------------------|--------|------------------------|--------|----------------|--------|
|                    | Hazard             | S. D.  | Hazard                 | S.D.   | Hazard         | S.D.   |
|                    | ratios             |        | ratios                 |        | ratios         |        |
| ESE                | 2,03               | (1,03) | 1.63                   | (0,83) | 1,91           | (0,99) |
| COO                | 0,57**             | (0,15) | 0,82                   | (0,11) | 0,77**         | (0,11) |
| Age                | 1,00               | (0,01) | 0,98                   | (0,02) | 0,99           | (0,02) |
| College            | 0,00               | (0,00) | 0,00                   | (0,00) | 0,00           | (0,00) |
| Female             | 0,32               | (0,15) | 0,53                   | (0,23) | 0,42*          | (0,19) |
| Startup Exp.       | 0,99               | (0,10) | 0,99                   | (0,11) | 0,99           | (0,02) |
| Industry Exp.      | 0,97               | (0,01) | 1,00                   | (0,02) | 0,99           | (0,02) |
| Parents ENs        | 1,77               | (0,79) | 1,12                   | (0,10) | 1,16           | (0,11) |
| Household Wealth   | 1,17               | (0,10) | 1,12                   | (0,10) | 1,16           | (0,11) |
| Risk Preference    | 1,05               | (0,45) | 1,06                   | (0,46) | 1,22           | (0,51) |
| Product Dev.Comp.  | 2,21               | (0,97) | 1,75                   | (0,76) | 2,07           | (0,92) |
| Prepared Bus.Plan  | 1,52               | (0,73) | 1,50                   | (0,68) | 1,57           | (0,75) |
| Prepared Fin.Proj. | 1,51**             | (0,71) | 1,48                   | (0,67) | 1,52           | (0,70) |
| Initial Motivation | 1,47**             | (0,32) | 1,26                   | 0,29   | 1,22*          | (0,27) |
| Log Likelihood     | -51,68             |        | -60,90                 |        | -60,90         |        |
| Prob>Chi-square    | 0,03               |        | 0,03                   |        | 0,03           |        |
| AIC                | 154,15             |        | 151,82                 |        | 192,18         |        |
| BIC                | 97,21              |        | 266,83                 |        | 304,51         |        |

*Notes.* N=292. Standard errors are in brackets. Sig.\*\*\* $p < .01$ ,\*\* $p < .05$ ,\* $p < .10$ .. AIC represents the Akaike information criterion and BIC the Bayesian information criterion as measures of the relative quality of the three different survival models. The model with the smallest AIC/BIC best fits the data .

# Conclusion

## **Contributions on the relationship between overconfidence and firm performance**

The main contribution of this PhD dissertation is to provide some original ideas about the relationship between overconfidence and firm performance. Several lessons can be drawn from our results.

Our empirical study presented in Chapter 2 shows that the performance effect of overconfidence in the case of corporate CEOs should not be analyzed independently from other contextual factors such as the firm's past performances, corporate governance characteristics and compensation considerations. This is because as evidenced by our results contextual variables significantly affect the probability that a given CEO will manifest overconfidence during his tenure. To better explain this idea we can use the following analogy: think of overconfidence as a latent personality trait that can be activated only in some specific circumstances such as a position of power (Anderson and Galinskiy, 2006), stressful and scrutinized everyday life (Owen and Davidson, 2009), or accumulation of positive feedbacks.<sup>1</sup> When CEOs who carry this latent personality trait are recruited in firms that meet these contextual criteria they are likely to develop an exaggerated positive self-image, i.e., become overconfident. On the contrary, when they work in firms with strong corporate governance and less accommodating stakeholders their latent overconfidence trait is less likely to be activated. As a result, overconfidence cannot be considered as a purely individual feature but rather as the product of internal individual specificities

---

<sup>1</sup>See Chapter 2 References section for full quotation.

and external corporate characteristics. This would imply that firms where CEOs manifest overconfidence are different from firms where they do not. Hence, a cross sectional comparison of the performance of these two groups of firms does not provide robust findings concerning the performance effects of CEO overconfidence. By controlling for several kinds of firm differences our analysis alleviates this concern and shows that in our sample firms where CEOs manifest overconfidence outperform similar firms where CEO remain rational. Moreover, using a difference-in-differences estimation we show that the difference in the performances of these two groups of firms radically switched during the year when the CEO first manifested (for the base sample) or could have manifested (for the control sample) overconfidence. Hence our results provide significant support to the idea that, when studied in isolation from other performance drivers, CEO overconfidence positively influences firm performance.

The theoretical model of Chapter 3 permits to understand one of the mechanisms through which CEO overconfidence fosters firm performance. Namely, we show that an overconfident CEO who underestimates his cost of effort is more likely to implement a tournament-like pay structure at the top executive level. By doing this, he incentivizes his subordinates to more effort which eventually leads to an increase in firm value. Hence all the actors but the CEO himself benefit from the more competitive corporate environment that he promotes. Of course, the CEO subjectively believes that tournaments are beneficial for him as well. Through this reasoning we join recent theoretical developments about the potential benefits of CEO overconfidence in terms of improved leadership (Bolton et al. 2013) and incentives alignment (Gervais et al., 2011; Goel and Thakor, 2008).<sup>2</sup> Moreover, we complete our vision of the positive relationship between CEO overconfidence and firm performance by theoretically proposing one potential mediator of this relationship.

Last, Chapter 4's contribution is to demonstrate that not all kinds of confidence foster performance. More precisely, we show that in the entrepreneurship context, some

---

<sup>2</sup>See Chapter 1 References for full quotations.

types of confidence, namely confidence in opportunity outcomes can be “blinding” and lead to poor performances. Conversely, for other forms of confidence such as confidence in one’s abilities (self-efficacy) the positive impact on performance is corroborated. By generating strong and persistent motivation during the start-up process this kind of confidence increases the likelihood of a successful venture emergence. These results obtained for nascent entrepreneurs shed light on some interesting empirical questions about CEO overconfidence. Namely, they enlarge the existent debate over the “optimal” intensity of overconfidence by considerations about the variety of overconfident beliefs. However, more precise measures of the specific kinds of confidence that qualify professional managers can only be based on ad-hoc survey data which is rarely available in this field.<sup>3</sup>

### **Contributions on the relationship between overconfidence and corporate governance**

The second major contribution of this PhD Thesis concerns the relationship between CEO overconfidence and corporate governance. As previously, we propose both empirical and theoretical insights regarding this relationship.

On the empirical level, we show in Chapter 2 that: (i) CEOs are more likely to manifest overconfidence in firms with weak corporate governance, and (ii) there is a negative interaction effect of CEO overconfidence and corporate governance on firm performance. One possible interpretation of these results is that there might be a certain form of adaptation of firms with weak corporate governance such that the lack of governance mechanisms allowing to align the interests of shareholders and executives can be compensated by the fact that the CEO develops an overconfidence bias which naturally leads to interest alignment. In other words, according to this interpretation there would be two different well performing configurations for firms: one where corporate governance is strong and CEOs are rational and one where CEO overconfidence partly emerges from and compensates for the fact that the corporate governance in the firm is weak.

---

<sup>3</sup>An interesting example of such a study is the one of Graham et al. (2013) studying miscalibration among U.S. CFOs surveyed on a quarterly basis from 2001 to 2011.

On the theoretical level, our contribution concerning the relationship between CEO overconfidence and corporate governance draws upon the prediction that CEO overconfidence will be most valuable to shareholders in firms where the shareholders-executives agency conflicts are severe, i.e., where the parameter  $m$  from our model is small. This is because in those cases overconfident CEO would willingly implement a tournament whereas rational CEOs wouldn't. Since corporate tournaments are beneficial to shareholders this means that overconfident CEOs would act in the interest of shareholders more often than rational CEOs. Thus, CEO overconfidence generates similar result as classical corporate governance mechanisms, i.e., it leads to a reduction of the shareholders-executives agency conflict. This further confirms our intuition about the substitutability between CEO overconfidence and corporate governance as performance factors on the firm level.

Many questions remain open with regard to the central topic of this thesis. In the next few paragraphs I discuss various future research avenues inspired by this work and some more impending improvements of the working papers that have been presented here.

### **Future research avenues**

The critical review presented in Chapter 1 revealed important gaps in the literature and serious challenges for academicians. I believe that the subsequent studies in this literature will mainly follow three different paths: one that allows a better empirical evaluation of CEO overconfidence, one that explores more systematically the global organizational consequences of this bias, and one that focuses on adverse selection by studying in particular the market implications of the presence of overconfident actors on unbiased actors (Bernardo and Welch, 1999; Manove and Padilla, 1999; Vilanova 2012). Some of the considerations in this third path that concern the design of financing contracts and CEO recruitment policies can be of particular interest for the corporate finance researchers.

Chapter 2 is also insightful in terms of potential topics for future research. I am

fully aware that multiple mediators of the relationship between CEO overconfidence and performance lack empirical examination. Exploring the CEO's choices that convey the positive firm performance effect of CEO overconfidence is hence an exciting perspective. Moreover, the statistically significant negative interaction between CEO overconfidence and corporate governance leaves many questions open. For example, the possibility that there is a certain form of adaptation such that firms compensate their weak corporate governance by having an overconfident CEO raises the question of the origin of this potential adaptation. Is it shareholders or more precisely recruitment committees who, aware of the weakness of their corporate governance mechanisms, deliberately recruit overconfident CEOs or is it rather CEOs who become overconfident in response to the weak corporate governance in the firm? Our empirical results are consistent with the second option but do not reject the possibility of a specific selection mechanism operated by shareholders within the process of recruitment.

One of my most imminent research ambitions concerns an empirical testing of the tournament model presented in Chapter 3. As suggested in this chapter a joint analysis of, on one hand, the correlation between executives' pay gaps and CEO overconfidence, and on the other hand, the effects of these pay gaps on both turnover and firm value will provide a robust test of our theory. Moreover, it would let us discriminate between the opposing theories of pay inequalities in the top management team. I performed some preliminary data research in relation with this empirical objective mostly by consulting the Capital IQ and Orbis data bases. Following this inventory over available data, I remain optimistic as to the possibility of completing the theoretical model with an empirical verification.

At last, the analysis of the different effects of entrepreneurial self-efficacy and confidence in opportunity outcomes presented in Chapter 4, can be strongly enriched by a more thorough empirical examination of the mediators that convey the negative effect of confidence in opportunity outcomes on the likelihood of venture creation. In this sense,

a mail survey supplement to the PSED I questionnaire include some interesting items that we could use. More precisely it includes subjective estimation of competition intensity and other start-up obstacles. In parallel, recent theoretical developments show that entrepreneurial confidence can sometimes lead to an underestimation of the need for competitiveness that can be detrimental to entrepreneurs.<sup>4</sup> Testing whether a subjective underestimation of competition intensity mediates the relationship between confidence in opportunity outcomes and the probability of venture emergence can be the next step of our analysis.

---

<sup>4</sup>Edelman, L., Yli - Renko, H. (2010). The Impact of Environment and Entrepreneurial Perceptions on Venture - Creation Efforts: Bridging the Discovery and Creation Views of Entrepreneurship. *Entrepreneurship Theory and Practice*, 34(5), 833-856.

# List of Tables

|             |                                                                                                                 |     |
|-------------|-----------------------------------------------------------------------------------------------------------------|-----|
| Chapter I:  | Table 1: La prépondérance de dirigeants surconfiants                                                            | 26  |
| Chapter II: | Table 1: Determinants of Overconfidence                                                                         | 51  |
|             | Table 2: Summary statistics                                                                                     | 52  |
|             | Table 3: Overconfidence, Operating Performance and Value                                                        | 58  |
|             | Table 4: CEO Overconfidence and Stock Market Performance                                                        | 59  |
|             | Table 5: Determinants of Overconfidence (Time Invariant)                                                        | 61  |
|             | Table 6: Long-run returns to different portfolios                                                               | 63  |
|             | Table 7: Performance of Overconfident CEOs by quality of corporate governance                                   | 66  |
|             | Table A.1: List of variables                                                                                    | 74  |
|             | Table A.2: Correlation matrix                                                                                   | 75  |
|             | Table A.3: Dynamic Panel Regressions over $\Delta$ ROA, $\Delta$ ROE and $\Delta$ Tobin's Q                     | 77  |
| Chapter III | Table A.1: List of variables                                                                                    | 113 |
| Chapter IV  | Table 1: Correlation matrix and summary statistics                                                              | 133 |
|             | Table 2: Weibull regression models to predict the effects of ESE and COO on the transition to venture emergence | 136 |
|             | Table 3: Multinomial logistic regressions to predict the effects of ESE and COO on initial motivation           | 138 |
|             | Table 4: Analysis of moderated mediation                                                                        | 139 |
|             | Table A.1: List of variables                                                                                    | 153 |
|             | Table A.2: Alternative survival models                                                                          | 154 |



# List of Figures

|               |                                                                                                        |     |
|---------------|--------------------------------------------------------------------------------------------------------|-----|
| Introduction: | Figure 1: N° of articles mentioning Overconfidence in most prestigious Management and Finance journals | 2   |
| Chapter II:   | Figure 1: CEO Overconfidence, Operating Performance and Firm Value                                     | 56  |
|               | Figure A.1: Distribution of Differed Compensation                                                      | 76  |
| Chapter III:  | Figure 1: Timeline                                                                                     | 88  |
|               | Figure 2: Tournament outcomes and second period revenues                                               | 90  |
|               | Figure 3: Follower's equilibrium effort choices with respect to CEO overconfidence                     | 94  |
|               | Figure 4: Shareholders' preferences over CEO overconfidence                                            | 104 |
| Chapter IV    | Figure 1: Interaction effect of ESE and COO on initial motivation                                      | 140 |



# **Managerial Overconfidence: interactions with Corporate Governance and Firm Performance**

## **Résumé**

Face au constat d'une vision assez négative de la surconfiance managériale dans les travaux académiques en économie et gestion (analysée dans le premier chapitre de cette thèse) nous présentons des implications plus positives de ce biais sur la performance des entreprises. Ainsi, dans le Chapitre 2 nous réalisons une étude empirique qui tient compte de l'endogénéité de la surconfiance managériale et de sa contingence aux facteurs contextuels tels que la gouvernance de l'entreprise et la rémunération du dirigeant. Nous montrons que lorsque nous corrigeons le biais d'endogénéité dans les données (via la méthode de double différence) nous observons une relation positive entre la surconfiance managériale et la performance. Puis, dans le Chapitre 3 nous proposons un modèle théorique qui vise à présenter un médiateur potentiel de cette relation. Notre modèle prédit qu'un dirigeant surconfiant introduirait des tournois incitatifs au sein de l'équipe managériale plus souvent qu'un dirigeant rationnel. Ces tournois auraient pour effet d'accroître le niveau d'effort total fourni par les membres de l'équipe managériale et d'améliorer ainsi la performance de l'entreprise. Enfin, dans le Chapitre 4 nous démontrons via une étude sur des entrepreneurs naissants que deux types de confiance différents, la confiance en ses propres compétences et la confiance en la réussite de l'opportunité entrepreneuriale, ont des effets opposés sur la probabilité de réussite du processus entrepreneurial. Le premier type a un effet positif alors que le second a un effet négatif sur la probabilité de créer une entreprise opérationnelle.

**Mots clés:** Surconfiance, Gouvernance d'entreprise, Performance, Rémunération

## **Abstract**

In light of the observation of a globally negative vision of managerial overconfidence in the economics and management literature (analyzed in the first chapter of this PhD Thesis) we present some positive implications of the overconfidence bias on firm performance. In Chapter 2 we perform an empirical study that accounts for the endogeneity of managerial overconfidence and its contingency upon contextual factors such as corporate governance and managerial compensation. We show that when we control for the endogeneity bias in the data (through the difference-in-differences method) we observe a positive relationship between managerial overconfidence and firm performance. Then, in Chapter 3 we propose a theoretical model that presents one potential mediator of this positive relationship. Our model predicts that an overconfident CEO would implement incentivizing tournaments between the top management team members more often than a rational CEO. These tournaments would lead to an increase in the total effort supply of top executives and hence improve the performance of the firm. At last, in Chapter 4 we show, through a study of nascent entrepreneurs, that two different types of confidence, confidence in one's own abilities and confidence in opportunity outcomes have opposed effects on the likelihood of a successful start-up process. The first type has a positive effect whereas the second one has a negative effect on the probability to create an operating business.

**Keywords:** Overconfidence, Corporate governance, Performance, Compensation