



PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE
ESCUELA DE INGENIERIA

**THE DARK SIDE OF THE MOON: THE EFFECT
OF CEOS' OVERCONFIDENCE ON
PERFORMANCE DURING MACROECONOMIC
RECESSIONS**

JOAQUÍN EUGENIO TRUCCO VERA

Thesis submitted to the Office of Research and Graduate Studies in partial fulfillment of the requirements for the Degree of Master of Science in Engineering

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ROBERTO VASSOLO

Santiago de Chile, November 2017

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Gratefully to my parents and siblings

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ABSTRACT

Despite decades of analysis on the effect of recessions on firms' financial performance, managers often fail to implement strategies that research has proven to be successful when facing macroeconomic contractions. We analyze the effect of CEOs' overconfidence on the performance of their companies during macroeconomic recessions. In general, overconfidence biases CEOs' decisions, leading them to overinvest in low-value projects and underestimate risk, therefore decreasing firm's organizational and financial flexibility. During recessions, firms require a greater ability to adapt to organizational changes, as there are greater nontrivial pressures on companies' profitability. Therefore, we contend that a CEO's overconfidence is especially dangerous to the performance of his/her company during a recession. We also argue that a CEO with previous experience in that position during an economic recession can help mitigate the negative effect of overconfidence. Empirical results from 214 industries in the US during the period 1992 – 2015 strongly support our reasoning.

KEYWORDS: Recessions, Life cycle, CEO overconfidence, Experience.

RESUMEN

A pesar de décadas de análisis del efecto de las recesiones en el desempeño financiero de las empresas, a menudo los gerentes fallan en implementar estrategias que los investigadores han probado son exitosas al enfrentar una contracción macroeconómica. En este trabajo analizamos el efecto de la sobre confianza de los gerentes generales en el desempeño de sus empresas durante recesiones macroeconómicas. En general, el exceso de confianza sesga las decisiones de los gerentes generales, llevándolos a sobre invertir en proyectos de bajo valor y a subestimar el riesgo, por consiguiente genera una disminución en la flexibilidad organizacional y financiera de la empresa. Durante periodos de recesión, las firmas requieren una mayor capacidad para adaptarse a cambios organizacionales, puesto que hay mayores presiones no triviales en la rentabilidad de la compañía. Por lo tanto, nosotros afirmamos que el exceso de confianza en gerentes generales es especialmente peligroso durante una recesión. Además, nosotros argumentamos que los gerentes generales con experiencia previa, en ese cargo, durante recesiones económicas pueden ayudar a mitigar los efectos negativos del exceso de confianza. Nuestros resultados empíricos basados en 214 industrias de Estados Unidos durante el periodo 1992 – 2015 apoyan fuertemente este razonamiento.

Palabras Clave: Recesiones, Ciclo de vida, Exceso de confianza de gerentes generales, Experiencia

1. ARTICLE BACKGROUND

1.1. Introduction

An empirical research done by Gulati, Nohria, and Wohlgezogen (2010), which studies the performance of 4,700 companies that navigated macroeconomic recessions, evidence that the major percentage of these firms could not successfully face a period of contractions, either reducing its performance or exiting the market. This study shows the catastrophic consequences that a recession can have on companies, but is this just an effect of these exogenous events, even when they have been deeply studied or could be attributed to another explanation?

The macroeconomic recessions are the dark side of the long-term growth trend of the business cycle. Even though, they are homogenous events, they have heterogeneous effects on companies' performance (Chakrabarti, Singh, and Mahmood, 2007; Garcia-Sanchez, Mesquita, and Vassolo, 2014; Mascarenhas and Aaker, 1989). Scholars have widely studied this topic and came up with many and diverse strategies to affront periods of contractions, such as allocate resources on tangible assets before a recession (Garcia-Sanchez, Mesquita, and Vassolo, 2014), on tangible assets during that period (Flammer and Ioannou, 2015), and having strategic, and financial flexibility ahead of a recession (Garcia-Sanchez, Mesquita, and Vassolo, 2014). As an answer to the question establish in the former paragraph, research suggest that companies tend to take wrong decisions or strategies on this periods of economic contraction (Gulati, Nohria, and Wohlgezogen, 2010). Even more, these decisions are biased by their psychological traits (Busenitz and Barney, 1997; Zacharakis and Shepherd, 2001).

In this research we chose CEOs' overconfidence as the explanation to this deviation from the rational procedure to affront a recession because this concept explains the differences in firms' strategies and the wrong decisions undertaken by their CEOs (Malmendier and Tate, 2005, 2008; Busenitz and Barney, 1997; Zacharakis and Shepherd, 2001; Ho et al., 2016). Overconfidence creates a "better than average" effect, where individuals believe that their skills are superior compared to others (Larwood and Whittaker, 1997; Svenson, 1981).

Our results strongly suggest that CEOs' overconfidence is especially dangerous during periods of economic contractions as CEOs' tend to overinvest on poor NPV projects associate to its risk and sacrifice financial and strategic flexibility. In addition, our findings suggest that the negative consequences of overconfidence can be mitigated if CEOs have experience on that position in previous periods of recessions. Even more, we found that the kind of experience is relevant to this mitigation effect.

The remainder of this chapter is organized as follows. Section 1.2 discusses the main objectives of this research. Section 1.3 present and introduces the literature review on macroeconomic recessions and overconfidence. 1.4 presents the methodology and data used. Section 1.5 exhibit the findings and conclusions of this research. Following this, Chapter 2 is composed by five sub sections and contains the main structure of the thesis. Section 2.1 introduces recessions, CEOs' overconfidence and its relationship, as well as the derivation of hypotheses and main findings. Section 2.2. develops the theoretical framework and the reasoning to produce two hypotheses. Section 2.3. describes the sources, the data, variables and methodology to prove the hypotheses. Section 2.4 shows

the main results, as well as a robustness check of the main concerns of this thesis. Finally, sections 2.5 concludes and discusses this thesis.

1.2. Objectives and Hypotheses

The main goal of this thesis is to elucidate why overconfident CEOs make wrong decisions ahead or during periods of macroeconomic recession, even when there is a vast quantity of research on strategies to successfully navigate recessions.

In order to explain and demonstrate the goal of this thesis we suggest that overconfidence is the responsible of CEOs' miss judgment and therefore of firms' poor performance. In this line, two objectives emerge.

The first objective is to prove that overconfidence is especially dangerous during recessions. In order to accomplish this objective, we develop a rational line of argumentation and an econometric model that test hypothesis one: *During recessions, the performance of firms led by overconfident CEOs suffers more than the performance of other firms.* The argument stands that overconfident CEOs tend to overinvest and reduce financial and strategic flexibility ahead of recessions, which produces a reduction on company's performance during the contraction as the firm enters the recession in a weaker condition. The model includes recession and non-recession years, and tests if recession, overconfidence, and their interaction have negative effects on performance.

The second objective is to test whether the negative effects of overconfidence could be mitigated by introducing experience in previous recessions as a moderator. To achieve this objective, a second line of argumentation and model are developed to test hypothesis two: *CEOs' experience navigating past recessions decreases the negative effect of overconfidence on firm performance.* We posit that overconfident CEOs with

previous recession experience engage in less poor performance projects, since they are less willing to take financial risks, overestimate returns, and overinvest. In addition, the model tests if companies managed by overconfident CEOs with experience have an improvement in performance compared with those without experience.

1.3. Literature Review

We organize our review of antecedents into two sections. First, we review literature that aims to determine how firms can successfully navigate recessions. Second, we incorporate insights on overconfidence from the decision-making literature that might explain persistent competitive failures during recessions.

We start by defining recessions and highlighting their main effects on competitive dynamics. Business cycles are deviations of the aggregate real output of the economy from its long-term growth trend, alternating between recessions and recovery periods (Kydland and Prescott, 1990; Lucas, 1977). Recessions are transitory contractions of the level of economic activity that vary in intensity and duration and involve changes in absolute prices, as well as relative prices among inputs and outputs (Mascarenhas and Aaker, 1989). These changes transitorily increase rivalry and reduce resource munificence, affecting competitive dynamics between rivals and firms' sustainable advantages (Chakrabarati et al., 2007; Chakrabarati et al., 2011; Garcia-Sanchez, Mesquita, and Vassolo, 2014).

1.3.1 The Study of Recessions in Management Literature

The study of recessions has been characterized by the lack of a unified theory to explain their varied effects across industries and organizations, and it has been rarely

subjected to empirical testing (Bromiley, Navarro, and Sottile, 2008). Nevertheless, an extensive literature explores strategies for improving performance during and after recessions. Although recessions endanger organizations, they also bring opportunities to improve performance (Meyer, 1982; Bishop, Graham, and Jones, 1984; Greer and Ireland, 1992; Chakrabarti, Singh, and Mahmood 2007; Wan and Yiu, 2009; García-Sánchez, Mesquita, and Vassolo, 2014; Flammer and Ioannou, 2015). Two kinds of strategies have been studied in the CEO overconfidence literature: offensive and defensive investment. The recommendations regarding these strategies change depending on the timing of their execution, as they can be carried out both before and during recessions.

The work of García-Sánchez, Mesquita, and Vassolo (2014) explores offensive investments ahead of a recession. Their mathematical model shows that prior to a recession, firms need to build scale economies and technological leadership in order to create sources of competitive advantage. Investment aggressiveness in preemption and technology is vital, because recessions transitorily alter the value of isolating mechanisms, generating new opportunities for firms. Similarly, Vassolo et al. (2017) show that investing in supply-side isolating mechanisms is vital in the prelude to a recession in order to gain market share once the recession begins. Indeed, higher investments in property, plant, and equipment during economic expansions allow firms to build scale economies and cost efficiencies, helping them to increase their market share during recessions.

Notwithstanding the foregoing, according to García-Sánchez, Mesquita, and Vassolo (2014), there is a trade-off associated with adopting an offensive strategy preceding a recession, as this might jeopardize a firm's strategic flexibility. The effectiveness of the investment will highly depend on a firm's strategic flexibility. Firms

with higher strategic flexibility experience greater market share gains during recessions (Vassolo et al., 2017). Therefore, even though investing at a higher pace brings advantages related to cost efficiency, it may also increase the risk of mortality if the investments decrease financial flexibility.

In the recession literature, the work of Bishop, Graham, and Jones (1984) explores offensive attitudes during recessions; it is one of the first studies to analyze the relationship between recessions and control over prices in a context of countercyclical hiring. Bishop et al. determine that the use of salaries instead of commissions for salespersons, flexible pricing, and direct distribution reduce the negative effects of economic recessions. In addition, Wan and Yiu (2009) argue that firms need to capitalize on the opportunities that recessions bring by increasing their investment levels. In fact, after analyzing Asian companies during the 1990s, they show that acquisitions during recessions are positively related to firm performance.¹ More recently, Flammer and Ioannou (2015) empirically show that companies that sustain their investments in intangible assets during recessions tend to perform better during and after economic contractions.

Taking a defensive approach ahead of a recession can have significant benefits for firms. Vassolo et al. (2017) argue that one of the main threats produced by recessions is unemployment. Unemployment reduces families' budgets, increasing their price sensitivity and leading them to prefer cheaper products to differentiated goods. Hence, defensive investment lowering the allocation of resources to areas such as R&D and advertising is recommended, which aim to increase product differentiation. On the

¹ These findings differ from our results. This can be explained because the authors use an alternative measure for performance and M&A. Also, they focus on Asian firms rather than US firms.

contrary, focusing on resource allocation in times of recession, Flammer and Ioannou (2015) show that decreasing investment in tangible resources during these periods of severe budget constraints and weak consumer demand can help companies perform better by increasing their liquidity.

In addition, Chakrabarti, Singh, and Mahmood (2007) examine the impact of diversification in different environments. They empirically show that highly diversified companies are more likely to exhibit inferior performance during recessions. This is partly because these firms must manage numerous challenges at the same time, increasing their exposure to multiple risks.

In spite of this evidence, we posit that executives continue to make flawed decisions during recessions, which increase the possibility of their companies to fail. Gulati, Nohria, and Wohlgezogen (2010) analyze over 4,700 public companies facing three different recessions. Results show that 17% of these firms did not survive these shocks. In addition, 80% of the survivors did not recover their pre-recession growth rates three years after a recession had ended. Moreover, 40% of the latter firms never recovered their absolute pre-recession growth rates regarding the studied time period. Unfortunately, just 9% of the sample emerged from the recessions in a better financial position. In addition to this, Pearce and Michael (2006) show that in the US, over 500,000 companies of different sizes failed in each of the three recessions that have occurred since 1990. Moreover, between 2001 and 2003 (a period that includes the bursting of the dot com bubble of 2001), 100 firms with liabilities greater than \$1 billion filed for bankruptcy in the United States (Altman and Hotchkiss, 2010), evidencing that corporate failure rates increase during periods of economic contraction.

1.3.2. Overconfidence Literature

We choose to focus on overconfidence rather than other potential CEO biases because this concept can explain the differences in firms' strategies and the wrong decisions undertaken by their CEOs (Malmendier and Tate, 2005, 2008; Busenitz and Barney, 1997; Zacharakis and Shepherd, 2001; Ho et al., 2016). In addition, some of the greatest corporate failures, such as Enron, Global Crossing and the National Kidney Foundation among others, have been ascribed to overconfidence (Picone, Dagnino, and Minà, 2014).

Self-confidence is often related with leadership and success; some even consider it a pre-requisite for becoming a great leader. Though self-confidence may be a necessary characteristic for executives, an excess of this trait can have negative managerial implications. Overconfidence generates a psychological bias, leading CEOs to feel that they have better judgment than their subordinates (Ferris, Jayaraman, and Sabherwal, 2013). This sense of superiority creates a "better than average" effect, where individuals tend to exaggerate their skills compared to others (Larwood and Whittaker, 1997; Svenson, 1981).

Overconfident CEOs tend to believe that their management skills are above average, attributing positive outcomes solely to their abilities and denying their responsibility for negative outcomes. A vast quantity of studies has demonstrated that overconfidence has negative effects on investing in projects, making acquisitions, receiving feedback, and forecasting a firm's outcomes (Roll, 1986; Malmendier and Tate, 2005, 2008; Hribar and Yang, 2015; Hsieh, Bedard, and Johnstone, 2014; Schrand and Zechman, 2012; Chen, Crossland, and Luo, 2015; Ho et al., 2016). Roll (1986) pioneered

these ideas with his “hubris hypothesis.” In his research on M&A transactions, he found that overconfident CEOs overestimate potential synergies and tend to pay bigger premiums than other CEOs. Moreover, Malmendier and Tate (2008) establish that overconfident CEOs, on average, are more likely to execute M&A transactions, and the market’s reaction to those acquisitions is more negative, as the acquirers overestimate their capacity to generate returns. Similarly, Malmendier and Tate (2005) show that overconfident CEOs overestimate the returns on projects and perceive external financing as costly, leading them to overinvest when they have internal resources available. This overinvestment can reduce a company’s financial flexibility, leaving it in a dangerous position in case of a recession.

Recent studies about overconfidence suggest that this trait is the main cause of bias in firms’ management forecasts (Hribar and Yang, 2015; Chen, Crossland, and Luo, 2015). Hribar and Yang (2015) find that forecasts made by overconfident CEOs are more likely to be misleading and have an optimistic bias, due to their overestimation of future returns. In addition, overconfident CEOs are less responsive to corrective feedback that could improve their management forecast accuracy (Chen, Crossland, and Luo, 2015). Erroneous, overoptimistic forecasts combined with reluctance to receive feedback can have serious consequences on a firm’s performance (Chen, Crossland, and Luo, 2015).

Recently, Ho et al. (2016) studied the relationship between overconfidence and recessions in the bank industry. These authors argue that overconfident CEOs tend to lower banks’ lending standards during recessions and increase their leverage compared to other CEOs, due to their overestimation of future returns and underestimation of downside

risk when making investments. Consequently, banks with overconfident CEOs failed more frequently than other banks during recession years.

1.4. Methodology

We study the effect of recessions on companies competing in a variety of industries in the United States. This research is accomplished by the development of two econometric models. Both of them are tested with a sample of 214 industries from the United States at the four-digit level of the SIC code, between the period 1992 – 2015, which includes two recessions (2001 and 2008-2009).

To test hypothesis one a panel data model is used. In addition, the sample contemplates every year of the period analyzed. In this model we use the percentage change in ROA of the company as the dependent variable and as our main covariate we use *Overconfidence*, which measures the CEO's excess of confidence through the exercise of stock option of her/his company. The purpose behind this model is to test if the overconfidence of the CEOs produces a negative effect on the performance of companies during recessions.

To test hypothesis two a panel model with GLS regressions is developed. This model contemplates a period of time that only considers the recession years. The dependent variable is the same one used in the former model and as main covariates we use the measurement of overconfidence and the variable *Experience*, which takes the value of one if the CEO was on the same company in a previous macroeconomic recession. The purpose behind this model is to evidence if experience has a moderating effect on the consequences of CEO's overconfidence.

1.5. Main Results and Conclusions

As mentioned earlier, scholars have allocated considerable effort to find and test the best strategies to successfully navigate macroeconomic recessions. Despite these efforts some CEOs tend to implement suboptimal strategies before and during recessions, which end up with their companies having low performance and even exiting the market. As an explanation we propose overconfidence as the variable biasing CEOs' capability of judgment. This psychological trait produces a better than average effect, making CEOs believe that they have greater and superior skills than their peers. Hence, CEOs confident on their abilities overestimate their company's returns, which reduces financial and strategic flexibility ahead of a recession producing a poor performance during the contraction period. In addition, overconfident CEOs tend to overinvest in poor NPV projects, which returns do not compensate risk. Therefore, investing on this kind of project ahead of a recession will decrease performance even more during this period.

Our results strongly support the former argumentation. Recession and overconfidence have a negative effect on companies' performance, but this effect increases when both of these variables are present at the same time. Therefore, an overconfident CEO is especially dangerous for firm performance during periods of contraction. In addition, our research contributes to the literature by introducing overconfidence as an important variable affecting the strategies taken by CEOs during recessions.

In this thesis, we argue that the experience of CEOs on past recessions helps to mitigate the negative effects of overconfidence. We empirically prove that the kind of

experience describe above is able to reduce the negative effects of overconfidence, helping CEOs and companies to navigate recession in a better manner.

Consequently, this research has several implications. First, it shows the importance of CEOs' decision making in hostile environments. Even more, we analyze how CEOs' personality can affect the performance of the company. These implications are fundamental to be considered by the board of directors and shareholders at the moment of hiring a CEO.

In addition, we suggest that it is important to consider the experience of CEOs as it can be crucial for them to perform better during recessions by mitigating negative effects of overconfidence. Once experience control the bad side of overconfidence, it could help to take advantage of the positive side, such as being more successful at developing new business, faster decision process, instill the pursue of organizational goals, among others (Picone, Dagnino, and Minà, 2014).

1.6. Further Research

This thesis intends to give support and prove two hypotheses, which were derived following a theoretical and rational approach, through a regression methodology ran over industries from the United States. In order to expand and generalize this finding outside the US it would be necessary to use a similar empirical approach on different continents and countries.

Future research should focus on different characteristics or psychological traits and observe if they have an effect on firms' performance. As personality is composed of a mix of different traits, it also would be interesting to observe if the presence of another psychological characteristic could affect the effect of overconfidence. Sometimes,

overconfidence is related to power and narcissism, therefore these could be good traits to address in that line of future research (Fast, et al., 2012; Campbell, Goodie, and Foster, 2014).

The second evidence that provides this research is the mitigating effect that experience has on CEO's overconfidence. We use three different ways to measure experience. Our results suggest that the kind of experience matters when mitigating the effect of overconfidence on firms' performance. This conjecture gives some interesting insights for future research. Scholars could further study the kinds of experience that can mitigate CEOs' overconfidence and the variables that could enhance or diminish this effect.

2. THE DARK SIDE OF THE MOON: THE EFFECT OF CEOS' OVERCONFIDENCE ON PERFORMANCE DURING MACROECONOMIC RECESSIONS

2.1. Introduction

Recessions are the dark side of the long-term growth trend of the business cycle. They are frequent occurrences that temporarily alter the competitive environment and often cause permanent changes in firms' sources of competitive advantage, survival, and long-term growth. Even though recessions affect the entire economy, they have heterogeneous effects on firms' competitive positioning, and consequently on their profitability (Chakrabarti, Singh, and Mahmood, 2007; Chakrabarti, Vidal, and Mitchell, 2011; Garcia-Sanchez, Mesquita, and Vassolo, 2014; Ghemawat, 1993; Latham, 2009; Mascarenhas and Aaker, 1989).

The literature analyzing the effect of recessions on different dimensions of business competition has expanded significantly over the last decades. Antecedents have analyzed the effects of entry order, isolating mechanisms, and financial flexibility on the evolution of competition in economically turbulent contexts (Garcia-Sanchez, Mesquita, and Vassolo, 2014; Klepper and Graddy, 1990; Klepper, 1997; Lieberman and Montgomery, 1988; Suarez and Lanzolla, 2007; Vassolo et al., 2017). However, despite the vast literature describing the optimal strategies for navigating recessions, many CEOs forgo a rational approach, instead embracing flawed tactics they have resorted to in the past. In fact, in their study of over 4,700 companies, Gulati, Nohria and Wohlgezogen (2010) find that only 9% of the sample recovered after a recession, showing how difficult was for CEOs to navigate it. Our goal is to explore the inconsistency between rational economic models and CEO behavior by identifying how CEOs' psychological traits affect corporate policies during recessions.

In particular, we first analyze how CEOs' overconfidence affects firms' financial performance during recessions. A well-studied form of overconfidence in the psychology literature is the better-than-average effect, which refers to individuals' systematic tendency to believe that they are better than they really are (Larwood and Whittaker, 1997; Svenson, 1981). Overconfident CEOs overestimate future cash flows from investment projects and the likelihood of their success (Hirshleifer and Luo, 2001; Malmendier and Tate, 2008; Gervais, Heaton, and Odean, 2011).

During recessions, overconfident CEOs in the banking industry have been found to increase leverage compared to other banks, increasing their firms' financial exposure under the belief that they are investing in projects that will be profitable for shareholders

(Ho, Huang, Lin, and Yen, 2016). This approach jeopardizes firms' performance during a recession, as the negative consequences of investing in suboptimal projects exacerbate the damaging effects of the recession. Furthermore, overconfident CEOs are more likely than other CEOs to raise funds by issuing debt rather than equity, as they believe their stocks to be undervalued (Malmendier and Tate, 2005). This weaker financial flexibility², combined with the reduced availability of credit from the financial industry (Sanchez, 1993), lead us to propose that overconfident CEOs hinder their firms' performance during recessions.

In addition, we focus on CEOs' experience as a possible moderator of overconfidence on recessions. It is important to study CEOs' personal experience because it influences their decision-making (Malmendier and Nagel, 2011). For instance, managers with experience in navigating a recession decrease their firms' levels of leverage during the years following the recession (Graham and Narasimhan, 2004). Knowledge of strategy is often gained experientially, since being exposed to different problems more than once helps individuals improve their approaches to solving these problems (Ansoff, 1991). Given this fact, we expect that facing a recession with experience as a CEO during a previous recession will help reduce the negative effects of overconfidence and therefore improve firm performance. A CEO that has overseen a firm in turbulent contexts, where outcomes tend to fall below expectations, will reduce financial risk, leverage, overestimation of future profits, and overinvestment. This past experience will help

² Financial flexibility refers to firms' ability to avoid financial distress in the face of negative shocks and to readily fund investments when profitable opportunities arise (Gamba and Triantis, 2007).

overconfident CEOs improve their performance in comparison to those with no experience navigating economic crises.

To test our hypotheses, we analyze the variation in performance across a panel of 214 different firms in US industries during 1992-2015, a period that includes two recessions: the bursting of the dot-com bubble in 2001 and the Great Recession of 2008-2009. We measure variation in performance as the change in a firm's return on assets (ROA) between consecutive years. The empirical analysis strongly supports our two main hypotheses. First, overconfident CEOs decrease their firms' ROA during recessions compared to non-overconfident CEOs. Second, companies led by overconfident CEOs who had been at the helm during past recessions perform better during recessionary periods than companies led by CEOs without such experience.

Our research makes several contributions to the literature. First, it contributes to the studies analyzing the effect of recessions on competitive evolution (Meyer, 1982; Bishop, Graham, and Jones, 1984; Greer and Ireland, 1992; Chakrabarti, Singh, and Mahmood 2007; Wan and Yiu, 2009; García-Sánchez, Mesquita, and Vassolo, 2014; Flammer and Ioannou, 2015) by introducing overconfidence as an important factor explaining why certain firms tend to adopt flawed policies during economic crises, despite the vast availability of information on strategies for maximizing performance during recessions. Additionally, it extends and validates the research on overconfidence and recessions (Ho et al., 2016) by showing that CEO overconfidence threatens firm performance across industries and organizations. However, our results suggest that boards can limit the negative consequences of overconfidence by hiring experienced CEOs.

2.2 Theory and Hypotheses

2.2.1. The Effect of Overconfident CEOs on Firm Performance during Recessions

CEOs play an important role in managing an organization and have a direct impact on corporate decisions and performance (Malmendier, Tate, and Yan, 2011). When studying firms, it is important to understand their CEOs' personalities, as CEOs have a direct influence on firms' decisions.

Among various personality traits, overconfidence has a particularly significant influence on firm outcomes, which we pose often biases corporate decisions regarding economic recessions. When the economy is good, overconfident CEOs overestimate the probability that it will continue to remain so (Ho et al., 2016). When a recession occurs, overly positive predictions and a defensive attitude towards negative feedback keeps these CEOs from detecting deficiencies in their strategies, even though these deficiencies may be evident to everyone else (Chen, Crossland, and Luo, 2015). As a consequence, firms led by overconfident CEOs have few incentives to reconsider their strategies and adjust to a changing environment.

High expectations for future performance drives overconfident CEOs to overestimate returns, underestimate risk and therefore overinvest (Hirshleifer and Luo, 2001; Malmendier and Tate, 2008; Gervais, Heaton, and Odean, 2011). As a consequence, overconfident CEOs carry out multiple projects with suboptimal levels of risk and return, which may ultimately lose money for shareholders. This overinvestment is even more problematic during recessions, since a weaker economy further lowers the already unfavorable chances of suboptimal projects' success.

CEO overinvestment has two major implications for firms during recessions. First, overinvestment leads firms to participate in multiple projects simultaneously, which threatens firms' organizational flexibility. During a recession, firms which are engaged in various projects lack from organizational flexibility due to their greater architectural complexity (Chakrabarti, Singh, and Mahmood, 2007). Being engaged in multiple projects during recessions, jeopardizes effective coordination within the firm and communication becomes more difficult; leading to face organizational, resource, information and management challenges that threaten firm's performance (Chakrabarti, Singh, and Mahmood, 2007). Moreover, organizational flexibility is necessary to identify major external changes and to respond quickly to different scenarios in highly uncertain and changing environments (Shimizu and Hitt, 2004). In hostile environments such as recessions, firms tend to be more prone to making errors; therefore, they require a greater ability to adapt to substantial organizational changes (Chen and Hambrick, 2012). Additionally, the lack of organizational flexibility causes firms to face more threats stemming from the decisions undertaken by their CEOs (Zhang, Tang, and Jahanshahi, 2017).

The second major implication of overinvestment for firms during recessions is that it threatens firm's financial flexibility. To be able to overinvest, firms need to raise capital. When companies do not have sufficient internal resources, they seek external funds. Faced with this necessity, overconfident CEOs choose debt over equity, as they believe their shares are undervalued (Malmendier and Tate, 2005). This leads overconfident CEOs to increase their leverage in face of a recession, as compared to their peers. Indeed, Ho et al. (2016) show that market leverage for banks with overconfident CEOs is on average about

5.37% higher than that of other banks, due to debt financing of their more aggressive investment policies. At the same time, financial markets are vastly affected by recessions, enormously reducing the availability of credit and therefore increasing the risk of bankruptcy for those companies with higher debt (Calvo and Mendoza, 1996; Calvo, Izquierdo, and Talvi, 2006). An increase in leverage in the lead-up to an economic crisis increases the exposure of firms led by overconfident CEOs, which may even cause their exit from the industry (Garcia-Sanchez, Mesquita, and Vassolo, 2014). Changing environments require executives to find the right balance between investing in good projects, and committing resources (Shimizu and Hitt, 2004) without threatening financial flexibility. However, recessions find firms with overconfident CEOs in an unfavorable position due to their overinvestment in multiple projects and high leverage, and consequently strike these firms harder than their peers. Henceforth, we hypothesize that:

Hypothesis 1: During recessions, the performance of firms led by overconfident CEOs suffers more than the performance of other firms.

2.2.2. The Effect of Experience on Firm Performance and Overconfident CEOs

Previous literature has found that CEO experience, defined as the educational (Malmendier and Tate, 2005) and early life experiences of the CEO (Malmendier, Tate, and Yan, 2011; Kolasinski and Li, 2013), can alleviate the impact of overconfidence.

Malmendier and Tate (2005) found that overconfident CEOs with a financial background (finance education or finance employment) invest better than other overconfident CEOs. In a different context, Malmendier, Tate, and Yan (2011) relate overconfidence to early life experiences. They show that overconfident CEOs who grew

up during the Great Depression in the 1930s tend to be reluctant to seek debt. Likewise, Kolasinski and Li (2013) show that after overconfident CEOs experienced personal stock trading losses, they made better decisions related to acquisitions. Having experienced periods of economic loss will affect individuals' future behavior under similar economic contexts and confronting a problem more than once helps to improve the way individuals solve future issues (Ansoff, 1991). As CEOs learn from education or past life experiences, they make better decisions, such as investing in more promising projects and choosing a more conservative financial position.

Bearing this in mind, past experience in recessions stands out as a moderator of CEO overconfidence. CEOs' behavior and strategies see profound changes after experiencing a recession. Economic shocks can activate a response that overrides an individual's cognitive orientation (Gulati, Nohria, and Wohlgezogen, 2010). Psychology literature argues that personal experience influences decision-making to a greater extent than statistical analysis, reading books or even education (Malmendier and Nagel, 2011). Increasing CEOs' exposure to particular problems allows the solutions to these problems to become hierarchically organized in their memories (Hogarth, 1987). In addition, previous experience with certain issues can allow CEOs to use tacit knowledge when making strategic decisions under similar scenarios in the future (Brockmann and Simmonds, 1997).

Previous experience in economic downturns affects CEOs' attitudes toward the development of new strategies for navigating recessions. This is because CEOs' choices of actions strongly depend on the payoffs they have obtained from the same actions in the past (Malmendier and Nagel, 2011). As a matter of fact, Malmendier, Tate, and Yan

(2011) show that those CEOs who lived through the Great Depression, opt for avoiding the capital markets as a source of financing in the aftermath.

Individuals who have gone through a recession, where stock-market returns tend to be low, will express lower willingness to take financial risk (Malmendier and Nagel, 2011). This is because recession experience leads to higher debt conservatism and underinvestment (Graham and Narasimhan, 2004; Malmendier and Tate, 2005; Malmendier, Tate, and Yan, 2011) leading experienced CEOs to be more reluctant to take financial risk and to choose their projects more carefully. Being more averse to financial risk should reduce CEOs' overestimation bias, discouraging them from overestimating returns from investment projects (Malmendier, Tate, and Yan, 2011). Consequently, by moderating their predisposition towards financial risk those overconfident CEOs who usually engage in suboptimal projects should be more likely to consider risk appropriately in their project valuations. In conclusion, previous experience will affect overconfident CEOs' investment policies, leading them to avoid excessive commitment of resources and overinvestment, therefore, encouraging them to engage in more value-creating projects.

CEO experience with recessions also affects a firm's leverage. Graham and Narasimhan (2004) analyzed corporate performance during and after the Great Depression. They found that those firms with higher levels of debt prior to the Great Depression had a higher probability of becoming financially distressed during the recession. Graham and Narasimhan (2004) also showed that having experienced the Great Depression led those highly leveraged firms to reduce significantly their level of debt both in the short and long term. Other authors also argue that having experienced the Great Depression explains CEOs' reluctance to borrow as they became more sensitive to the

volatility of investment's cash flows (Malmendier and Tate, 2005; Malmendier, Tate, and Yan, 2011).

Notwithstanding with the foregoing, Graham and Narasimhan (2004) show that the reluctance to borrow will be maintained as long as firms' CEOs remain at the helm of the company after the recession. Previous experience on recessions should have a higher impact on CEOs' attitudes than on those of other firm members since CEOs are the head of the organization and, therefore, the pressure of improving performance during recessions relies primarily on them. Having experienced a recession will help CEOs to adjust wrong previously made decisions and undertake better courses of action in the future.

In sum, it is difficult for those CEOs who have never experienced a recession, to be able to predict and prepare for them. We posit that experience is key to successfully navigating a recession. Moreover, we expect that overconfident CEOs with previous recession experience engage in fewer value-destroying projects than other overconfident CEOs, since they are less willing to take financial risks, overestimate returns, and overinvest. Besides, by reducing leverage, experienced CEOs are better prepared to face a possible recession, allowing them to seek more investing opportunities and reduce the risk of bankruptcy. Therefore, we hypothesize:

Hypothesis 2: CEOs' experience navigating past recessions decreases the negative effect of overconfidence on firm performance.

2.3. Data and Methods

2.3.1. Sample Selection and Sources of Information

We study the effect of recessions on companies competing in a variety of industries in the United States. We consider all industries at the four-digit level of the SIC code, such as Motor Vehicles and Passenger Car Bodies (SIC 3711), Telephone and Telegraph Apparatus (SIC 3661), and Air Courier Services (SIC 4522), among others. We do so to capture the most specific industry classifications, avoiding the problem of grouping together similar industries that are not competitors. For example, the SIC code 371 includes the Motor Vehicles and Passenger Car Bodies (SIC 3711) and the Truck and Bus Bodies (SIC 3713) industries; while these are similar, they do not compete with each other. We also exclude any industries whose SIC codes end with the digit 9, since they are tagged as “Not Elsewhere Classified” and therefore do not belong to any specific industry. Following this criterion, 214 industries remain.

For all companies in these industries, we gather data from four different sources: CRSP, Compustat, Thomson One, and the National Bureau of Economic Research. Information about firms’ stock returns is obtained from CRSP. This database contains daily and monthly information on security prices, returns and trading volume for the NYSE, AMEX and NASDAQ stock markets.³ We collect firm accounting and financial data from Compustat, which covers over 19,000 companies from the United States and reports annual data in millions of dollars from 1950. Our final reference for firm data is the Thomson One SDC Platinum Database. From this source, we gather information about

³ Stock returns data is available from 1926.

mergers and acquisitions (M&A) transactions, which were performed by public US companies and involved a change of control (i.e., the acquirer goes from a 50% or less stake in the target to a 50% or larger). It is worth noticing that this database reports reliable information about M&A transactions starting in 1982.⁴

We use Execucomp from Compustat to obtain CEOs' personal information and compensation. Execucomp reports executive compensation for S&P 1,000 firms starting in 1992 and includes base salary, bonuses, and stock options data. Finally, we collect information about recession from the National Bureau of Economic Research. This source contains the dates of the contractions of the US economy since year 1857.

For the 214 industries, we combine the information gathered from all four data sources, yielding a panel of data that covers 1,673 companies for the period from 1992 to 2015. This period includes the bursting of the dot com bubble of 2001 and the Great Recession of 2008-2009. In addition, during the sample period, we observe 4,260 M&A transactions and 2,770 different CEOs. The sample includes 13,228 firm-year observations, reported in US dollars.

Since we want to test how experience from past recessions affects the performance of firms led by overconfident CEOs during subsequent recessions, we create a subsample that only considers crisis years. This subsample contains 1,079 firms and 2,107 firm-year observations.

⁴ This database contains information from 1979-present; however, according to its description, the data is most reliable beginning in 1982.

2.3.2. Dependent Variables

As our dependent variable, we use the percentage change in return on assets. We compute return on assets (ROA) as a firm's operating income before depreciation divided by its total assets, and calculate percentage change in ROA as follows:

$$\text{Percentage change in } ROA_{j,t} = \frac{ROA_{j,t} - ROA_{j,t-1}}{ROA_{j,t-1}} \quad (2.1)$$

where the sub-index j represents the firm and t the year.

It is worth noting that we winsorize the data for this variable below the 5th percentile and above the 95th percentile (Welch, 2004). We do so to exclude firms with a very small ROA during a given year, for which insignificant upticks in the variable during the following year trigger enormous changes in percentage terms.

2.3.3. Main Covariates

Following Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011), we construct an options-based measure that helps us determine the level of CEO overconfidence. Typically, a risk-averse CEO would exercise his own firm's stock options early if these options are sufficiently in the money (Hall and Murphy, 2002).⁵ However, an overconfident CEO with positive expectations would assume that his/her firm's value will continue to grow and therefore postpone the exercise of in-the-money options to a greater extent than a non-overconfident CEO.

⁵ "In the money" means that the option has a positive nonzero value and it would be rational to exercise it.

Campbell et al. (2011) classify a CEO as highly overconfident if he/she holds options that are more than 100% in the money and repeats this behavior at least once during his/her tenure as CEO.⁶ This is represented by an indicator variable which takes the value of one from the moment the CEO holds in-the-money options for the second time until he/she leaves the sample.

To determine the average in the money level, we also follow the methodology devised by Campbell et al. (2011). To do so, we divide the total realizable value of the exercisable options by the number of exercisable options held by the CEO, obtaining RV (realizable value). Then we subtract RV from the stock price at the end of each fiscal year, obtaining AM (average exercise price of the option). Finally, the average in the money level of the options is calculated by dividing RV by AM .⁷

We measure *Recession* as a dummy variable that takes the value of one in recession years and zero otherwise. Since recession data is available on a monthly basis and our sample is on an annual basis, we consider a recession year as one with at least two consecutive quarters of contraction.

To test *Hypothesis 2* (H2) we add the variable *Experience*, a dummy variable that takes the value of one if the executive was CEO of the same firm throughout at least one

⁶ We cannot classify those CEOs who hold no options or hold options that are never in the money.

⁷ Campbell et al. (2011) also developed a measure of low confidence, defined as exercising stock options that are less than 30% in the money. To determine these in the money percentages, we divide the total value realized from exercising stock options by the number of options exercised, obtaining the per-option value realized. Then we subtract this value from the stock price at the fiscal year end to get the estimated average exercise price of the exercised options. Finally, the per-option value realized from exercising options is divided by the estimated average exercise price. Once a CEO is classified as overconfident, he/she retains this classification, unless he/she is categorized as low confident subsequently.

previous recession and for at least two years before the start of that recession. We believe that a CEO who assumes the position at the beginning of an economic recession will not be able to adapt to or learn from the experience.⁸

2.3.4. Control Variables

We use several control variables at the CEO, industry, and macroeconomic levels. At the CEO level, we control for CEOs' personal characteristics, as they are directly observable by the board and may be a selection criterion for the choice of CEO (Malmendier and Tate, 2005). Therefore, we include them as control variables to help avoid endogeneity problems. The first such variable is *CEO's age*, measured as the natural logarithm of the item "Age" from Execucomp. Older CEOs tend to be more overconfident (Ho et al., 2016), so we expect that a higher age will reduce performance. *CEO's gender* is included as an indicator variable, taking the value of one for female CEOs and zero otherwise. We also control for *CEO's salary intensity*, as previous studies suggest that CEO compensation motivates upward accrual-base earnings management (Hsieh, Bedard, and Johnstone, 2014). We compute this variable as "Salary" divided by the firm's sales for the year before an economic crisis.⁹ In general terms, we expect higher salaries to be associated with more competent CEOs, and therefore to be positively related to firm performance.

Additionally, we control for the level of *CEO's stock ownership* in the company, calculated as the percentage of shares owned by the CEO excluding options. It is important

⁸ Results remain substantially the same if we require one or zero years of experience as CEO before a recession.

⁹ The item "Salary" is defined, by Execucomp, as the dollar value of the base salary (cash and non-cash) earned by the CEO during the fiscal year.

to control for CEOs' level of ownership because it influences the decision of whether to exercise a stock option, biasing the overconfidence measure (Malmendier and Tate, 2008). In addition, we expect that a CEO with a higher level of ownership will improve firm performance as he/she has bigger incentives to do so.

At the firm level, it is necessary to control for the confounding effects of firms' characteristics in order to isolate the effect of CEOs' overconfidence on firms' decision-making. We control for the *Adjusted stock return* of each firm, defined as the annualized stock return over the lesser of the CEO's tenure or five years, minus the corresponding median return computed from firms in the same four-digit SIC code (Campbell et al., 2011).¹⁰ One important drawback of our measure for overconfidence is that it is affected not only by CEOs' decisions about the exercise of options but also firms' stock returns (Campbell et al., 2011). Therefore, we have incorporated the latter as a control variable to isolate the effect of the options exercise decision on the overconfidence measure, removing the noise of stock returns. A higher stock return represents higher firm performance (as compared to peers).

Firms' size, investment opportunities and leverage are important factors that influence their strategies and decisions. Bearing this in mind, we include *Firm size*, measured as the log of the firm's total assets. Large firms offer more extensive product lines, have more potential synergies to exploit and suffer more from managerial diseconomies (Lee, Venkatraman, Tanriverdi, and Iyer, 2010). Scale economies favor

¹⁰ The annualized stock return is calculated based on the monthly returns from CRSP, which are holding period returns from month-end to month-end, not compounded from daily returns, and assume that ordinary dividends are reinvested at month-end.

firms' positioning during recessions (Garcia-Sanchez, Mesquita, and Vassolo, 2014), so we expect bigger firms to improve their performance during recessions. We also control for changes in the amount of debt each company holds through the variable *Change in leverage*. The former represents the change in the debt to equity ratio between two consecutive years. Highly leveraged firms will be more strongly affected by recessions (Garcia-Sanchez, Mesquita, and Vassolo, 2014), producing a decrease in their performance. In addition, we add the variable *Tobin's Q* as a control for investment opportunities, calculated as market value of assets divided by the book value of assets (Gompers, Ishii, and Metrick, 2003). A higher *Tobin's Q* means better management and thus better performance. Finally, we add *Days sales outstanding*, calculated as the ratio between the average of accounts receivable times 365 and total sales (Filbeck and Krueger, 2005). This represents a crisis management variable, as firms might delay their payment deadlines in order to avoid losing customers. We expect this variable to have a negative effect on the performance of the company.

We also control for relevant M&A activity in which there is a change in control (i.e., acquirer ends up with more than 50% of the target). Hence, we compute the *Mergers and acquisitions* variable as the natural logarithm of the market capitalization of the acquired companies each year.¹¹ Those firms without cash will increase their leverage to perform M&A transactions (Malmendier and Tate, 2008); therefore, we expect this variable to be negatively related to firm performance during recessions.

Additionally, we control for bankruptcies, since firms that exit the industry

¹¹ To obtain the market capitalization for each target company, we divided the value of the transaction by the percentage of the company acquired. Both data items were obtained from Thomson One.

generate opportunities for other competitors to gain market share and improve performance. The indicator variable *Bankruptcy* takes a value of one if the company files for Chapter 7 or Chapter 11 bankruptcy that year and zero otherwise.¹² Firms facing bankruptcy are highly leveraged; therefore, we expect they will decrease their performance during a recession.

To control for industry-specific effects, we introduce *Industry dummies* at a 4 digit SIC level. To capture the possible impact of industry concentration on market share, we use the variable *Herfindahl index*. As usual, this variable is defined as the sum of the squares of the market shares of firms belonging to the same industry. It is important to control for the level of competition in an industry in order to isolate the effects of CEO experience and overconfidence on performance. As competition intensifies, recessions endogenously induce a shakeout of ineffective players, affecting their performance (Garcia-Sanchez, Mesquita, and Vassolo, 2014). Finally, we also control for variations in the interest rate through the variable *Change in interest rate*. This variable represents the change in the interest rate between years t and $t-1$. The Federal Reserve might change its monetary policy to help the country better cope with the recession; we expect that a decrease in interest rates would benefit firms' revenues, and therefore, firm's performance.

The variables that cause immediate changes in ROA (i.e., *Bankruptcy*, *Mergers and acquisitions* and *Change in interest rate*) are measured in the same year than the independent variable. The rest of the covariates and controls are computed one year before

¹² We hand collected the information on bankruptcies for the companies in our sample during the 1992-2015 period. We found four Chapter 7 and 38 Chapter 11 bankruptcies.

the crisis.

2.3.5. Estimation Technique

We use a panel-data model implemented over two different samples, which vary only in the time period they cover. For *Hypothesis 1* (H1), we fit a panel that includes all years between 1992 and 2015. The dependent variable is *Percentage change in ROA* and the main covariates are *Overconfidence* and *Recession*. The full econometric model is as follows:

$$\Delta ROA_{j,t} = \beta_0 + \beta_1 \text{Recession}_t + \beta_2 OC_{i,j,t} + \beta_3 OC \times \text{Recession}_{i,j,t} + \beta' CV1_{j,t-1} + \beta'' CV2_{i,j,t-1} + \beta''' CV3_{i,j,t} + \gamma_j + \varepsilon_{j,t} \quad (2.2)$$

Where $\Delta ROA_{j,t}$ is the percentage change in the ROA of the company and $OC_{i,j,t}$ stands for the variable *Overconfidence*. $CV1_{j,t-1}$ represents the control variables for firm j in year $t-1$. $CV2_{i,j,t-1}$ stands for the control variables for CEO i at firm j in year $t-1$. $CV3_{i,j,t}$ represents the control variables for CEO i at firm j in year t . Finally, γ_j captures the fixed effects for the industry and $\varepsilon_{j,t}$ represents the error term.

Similarly, we test H2 using a panel-data model with *Percentage change in ROA* as the dependent variable. However, in this analysis, we focus on the years 2001, 2008 and 2009, because we want to analyze how the overconfident CEOs and their experience with past recessions affect the performance of companies during recessions (i.e., the bursting of the dot-com bubble and the Great Recession). The main covariates for testing H2 are *Overconfidence* and *Experience*. The econometric model is as follows:

$$\Delta ROA_{j,t} = \beta_0 + \beta_1 \text{Experience}_{i,j,t} + \beta_2 OC_{i,j,t} + \beta_3 OC \times \text{Experience}_{i,j,t} + \beta' CV1_{i,t-1} + \beta'' CV2_{i,j,t-1} + \beta''' CV3_{i,j,t} + \gamma_j + \varepsilon_{j,t} \quad (2.3)$$

As in equation (1), $\Delta ROA_{j,t}$ is the percentage change in the ROA, $OC_{i,j,t}$ stands for *Overconfidence*, and $CV1_{i,t-1}$, $CV2_{i,j,t-1}$, and $CV3_{i,j,t}$, represent the control variables. In addition, γ_j controls for the industry fixed effects and $\varepsilon_{j,t}$ represents the error term.

To test H1 we work with panel data, which implies a risk of having heteroscedasticity and serial correlation issues, which are two common econometric problems that may arise when working with large-scale empirical models. In fact, we confirm the presence of both, heteroscedasticity with a likelihood-ratio test and autocorrelation with a Wooldridge test (Wooldridge, 2003), and therefore, fit our panel-data model correcting for these two potential biases.

On the other hand, in the set of models used to test H2, we only focus on recession years, which are not all contiguous. This sample should not have problems of autocorrelation. However, we do test for the presence of heteroscedasticity with a likelihood-ratio test. Since we observe evidence of heteroscedasticity, we fit the panel-data model using a GLS regression with panel-corrected standard errors, which accounts for heteroscedasticity across firms.

2.4. Empirical Findings

2.4.1. Summary Statistics

Table 2.1. and 2.2. show descriptive statistics and pairwise correlations for our main variables during the period 1992 – 2015, respectively.

Table 2.1. Descriptive Statistics

VARIABLES	N	Mean	SD	Min	Max
Percentage change in ROA	2,108	-0.0908	0.439	-1.969	1.872
Overconfidence	2,108	0.457	0.498	0	1
Overconfidence x Recession	2,108	0.457	0.498	0	1
Experience	2,108	0.282	0.450	0	1
Overconfidence x Experience	2,108	0.184	0.387	0	1
CEO's age	2,108	4.001	0.128	3.584	4.454
CEO's gender	2,108	0.0223	0.148	0	1
CEO's salary intensity	2,108	1.610	10.78	-0.154	285.2
CEO's share ownership	2,108	18.07	44.76	0	613.9
Adjusted stock return	2,108	0.116	0.292	-0.842	5.556
Bankruptcy	2,108	0.00427	0.0652	0	1
Change in leverage	2,108	0.170	2.155	-37.43	65.49
Days sales outstanding	2,108	112.5	404.3	-127.6	5,526
Firm size	2,108	7.692	1.747	1.926	13.93
Mergers and acquisitions	2,108	0.968	2.104	0	10.09
Tobin's Q	2,108	1.948	1.754	0.435	36.19
Herfindahl index	2,108	0.215	0.177	0.0133	1
Change in interest rate	2,108	-0.615	0.152	-0.791	-0.407

Table 2.2. Pairwise Correlations

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
(a) Percentage change in ROA	1								
(b) Overconfidence	-0.043*	1							
(c) Overconfidence x Recession	-0.043*	1	1						
(d) Experience	-0.0012	0.24***	0.24***	1					
(e) Overconfidence x Experience	0.0058	0.52***	0.52***	0.76***	1				
(f) CEO's age	-0.037†	0.14***	0.14***	0.24***	0.21***	1			
(g) CEO's gender	0.0024	-0.035	-0.035	-0.023	-0.022	-0.046*	1		
(h) CEO's salary intensity	0.025	0.011	0.011	-0.018	-0.019	-0.026	-0.0051	1	
(i) CEO's share ownership	0.018	0.058**	0.058**	0.30***	0.19***	0.11***	-0.031	-0.0030	1
(j) Adjusted stock return	-0.019	0.094***	0.094***	-0.027	0.0082	-0.12***	-0.056*	0.0056	0.025
(k) Bankruptcy	0.0082	-0.031	-0.031	-0.0087	-0.012	-0.015	-0.0099	-0.0057	-0.019
(l) Change in leverage	0.022	-0.015	-0.015	-0.015	-0.0092	-0.016	0.019	0.012	-0.0040
(m) Days sales outstanding	-0.037†	0.058**	0.058**	0.053*	0.072***	0.11***	-0.019	-0.0043	-0.0074
(n) Firm size	0.026	-0.00018	-0.00018	-0.11***	-0.043*	0.16***	-0.037†	-0.20***	-0.18***
(o) Mergers and acquisitions	-0.054*	0.051*	0.051*	-0.020	-0.00025	-0.027	-0.037†	-0.030	-0.039†
(p) Tobin's Q	0.013	0.20***	0.20***	0.033	0.057**	-0.076***	-0.034	0.10***	0.056**
(q) Herfindahl index	0.011	-0.0079	-0.0079	-0.049*	-0.046*	0.029	-0.025	-0.026	0.0047
(r) Change in interest rate	-0.012	0.015	0.015	-0.069**	-0.061**	-0.018	-0.055*	0.0045	0.054*

	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
(j) Adjusted stock return	1								
(k) Bankruptcy	-0.053*	1							
(l) Change in leverage	-0.0055	0.0086	1						
(m) Days sales outstanding	-0.021	-0.011	-0.0087	1					
(n) Firm size	-0.17***	-0.0029	-0.015	0.18***	1				
(o) Mergers and acquisitions	0.080***	-0.030	0.0057	-0.013	0.14***	1			
(p) Tobin's Q	0.41***	-0.028	-0.0089	-0.064**	-0.20***	0.083***	1		
(q) Herfindahl index	-0.093***	0.028	0.016	-0.0065	-0.066**	-0.016	-0.067**	1	
(r) Change in interest rate	0.16***	-0.00086	-0.018	-0.020	-0.072***	0.11***	0.23***	-0.099***	1

† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2.4.2. Regression Results

Table 2.3. reports the results for the panel-data model used to test H1 by analyzing the effect of CEO overconfidence on firm performance during recessions. We provide an R-squared and a Wald test as a measurement of goodness of fit for the model and a comparison between models, respectively.

In Table 2.3., the main dependent variable is *Percentage change in ROA*. Results presented in the second column show that *Recession* has a negative and significant effect on a firm's change in ROA. The regression coefficient is -0.0472 ($p < 0.1\%$). The third column also shows that *Overconfidence* has a negative and significant effect on a firm's change in ROA. The regression coefficient is -0.0215 ($p < 0.1\%$). Finally, the results in the fourth column show that the performance of firms with overconfident CEOs declines more during economic crises than that of the rest of the firms in the sample. The regression coefficients for *Recession*, *Overconfidence*, and *Overconfidence x Recession* are -0.0260, -0.0132 and -0.0452 ($p < 5\%$, $p < 10\%$ and $p < 0.1\%$, respectively).

The Wald test shows that model four fits the data significantly better than models two and three, providing further support for the relationship between performance and overconfidence. These findings ***strongly support H1***.

Table 2.3. Change in Profitability Due to Economic Recession, Overconfidence and Interaction

VARIABLES	(1)	(2)	(3)	(4)
CEO's age	-0.0447 (0.0276)	-0.0495† (0.0279)	-0.0334 (0.0278)	-0.0376 (0.0281)
CEO's gender	0.00455 (0.0229)	0.00318 (0.0232)	0.00332 (0.0228)	0.00139 (0.0230)
CEO's salary intensity	9.29e-05† (5.30e-05)	9.18e-05† (5.29e-05)	9.46e-05† (5.30e-05)	9.22e-05† (5.30e-05)
CEO's share ownership	4.65e-05 (7.15e-05)	5.32e-05 (7.26e-05)	4.93e-05 (7.18e-05)	5.38e-05 (7.26e-05)
Adjusted stock return	0.0345* (0.0135)	0.0372** (0.0135)	0.0364** (0.0134)	0.0383** (0.0135)
Bankruptcy	-0.0872 (0.0758)	-0.0835 (0.0754)	-0.0881 (0.0761)	-0.0861 (0.0756)
Change in leverage	0.000621 (0.000533)	0.000624 (0.000526)	0.000586 (0.000532)	0.000602 (0.000527)
Days sales outstanding	-4.55e-05† (2.44e-05)	-4.64e-05† (2.45e-05)	-4.55e-05† (2.46e-05)	-4.43e-05† (2.46e-05)
Firm size	0.00972*** (0.00261)	0.00966*** (0.00263)	0.00989*** (0.00262)	0.0100*** (0.00263)
Mergers and acquisitions	-0.0116*** (0.00130)	-0.0118*** (0.00130)	-0.0115*** (0.00130)	-0.0118*** (0.00131)
Tobin's Q	-0.00732* (0.00302)	-0.00762* (0.00304)	-0.00631* (0.00301)	-0.00645* (0.00303)
Herfindahl index	0.116* (0.0452)	0.123** (0.0454)	0.117* (0.0453)	0.125** (0.0454)
Change in interest rate	0.0734*** (0.00727)	0.0443*** (0.00982)	0.0733*** (0.00727)	0.0449*** (0.00982)
Recession		-0.0472*** (0.0111)		-0.0260* (0.0132)
Overconfidence			-0.0215** (0.00689)	-0.0132† (0.00741)
Overconfidence x Recession				-0.0452** (0.0165)
Constant	0.120 (0.107)	0.0664 (0.113)	0.0736 (0.108)	0.0841 (0.109)
Industry dummy	yes	yes	yes	yes
Observations	13,225	13,225	13,225	13,225
R-squared	0.046	0.047	0.047	0.048
Number of firms	1,673	1,673	1,673	1,673
Wald test	-	18.121***	9.712**	7.474***

Dependent variable: Percentage change in ROA.

Standard errors in parentheses.

*** p<0.001, ** p<0.01, * p<0.05, † p<0.1

Linear regression with panel-specific AR(1) correlation and heteroscedasticity corrections.

Table 2.4. reports the results for the panel-data model used to test H2 by analyzing the impact of CEOs' experience on the negative effects of overconfidence during recessions. We provide an R-squared and a Wald test as a measurement of goodness of fit for the model and a comparison between models, respectively.

We test H2 by introducing the main covariate *Experience* and the interaction between *Overconfidence* and *Experience*. Results presented in the fourth column of Table 2.4. show that the performance of firms with overconfident CEOs declines during the bursting of the dot-com bubble and the Great Recession. However, this effect is diminished when overconfidence is accompanied by previous experience navigating recessions. The regression coefficients for *Overconfidence*, *Experience*, and *Overconfidence x Experience* are -0.0593, -0.0220, and 0.0838 ($p < 0.1\%$, $p < 5\%$, and $p < 0.1\%$, respectively).

Furthermore, Table 2.4. highlights the significance of some of our control variables.¹³ As predicted, higher *CEO's share ownership*, *Firm size*, *Tobin's Q*, and *Herfindahl index* ($p < 0.1\%$, $p < 0.1\%$, $p < 0.1\%$, and $p < 0.1\%$ respectively) increase performance during recessions. On the other hand, *CEO's age*, *Days sales outstanding*, and *Mergers and acquisitions* ($p < 0.1\%$, $p < 10\%$, $p < 0.1\%$) negatively affect firms' performance during recessions.

The Wald test shows that the model in the fourth column of Table 2.4. fits the data significantly better than the base model. These results support the idea that experience mitigates the negative effect of overconfidence on firms' performance and

¹³ The significance of control variables is not explained for Table 3 because it includes the effects of both non-recession and recession years; it is not feasible to make conclusions about control variables in this context.

provide evidence to *strongly support H2*.

Table 2.4. Relationship between Experience and Overconfidence during Economic Recessions

VARIABLES	(1)	(2)	(3)	(4)
CEO's age	-0.251** (0.0867)	-0.188*** (0.0234)	-0.212*** (0.0226)	-0.215*** (0.0229)
CEO's gender	-0.0667 (0.0771)	-0.0133 (0.0239)	-0.00892 (0.0247)	-0.0148 (0.0225)
CEO's salary intensity	0.000848 (0.00148)	0.000578 (0.000542)	0.000557 (0.000595)	0.000568 (0.000550)
CEO's share ownership	0.000486 (0.000318)	0.000471*** (6.95e-05)	0.000402*** (7.58e-05)	0.000419*** (7.58e-05)
Adjusted stock return	-0.0448 (0.0491)	-0.0240* (0.0110)	-0.0236* (0.00983)	-0.0256* (0.0104)
Bankruptcy	0.127 (0.163)	-0.00201 (0.0837)	-0.00186 (0.0851)	0.00184 (0.0816)
Change in leverage	0.00235 (0.00343)	0.00122 (0.00174)	0.00103 (0.00172)	0.00185 (0.00180)
Days sales outstanding	-4.47e-05 (7.66e-05)	-3.69e-05* (1.72e-05)	-2.68e-05 (1.89e-05)	-3.51e-05† (1.86e-05)
Firm size	0.0280** (0.00882)	0.0240*** (0.00196)	0.0234*** (0.00185)	0.0233*** (0.00209)
Mergers and acquisitions	-0.0158*** (0.00467)	-0.0127*** (0.000930)	-0.0127*** (0.000967)	-0.0128*** (0.00109)
Tobin's Q	0.00319 (0.00949)	0.00646*** (0.00160)	0.00355** (0.00137)	0.00647*** (0.00107)
Herfindahl index	0.203 (0.217)	0.270*** (0.0377)	0.238*** (0.0382)	0.249*** (0.0313)
Change in interest rate	0.119† (0.0688)	0.0864*** (0.0147)	0.0940*** (0.0139)	0.0961*** (0.0137)
Overconfidence		-0.0294*** (0.00510)		-0.0593*** (0.00537)
Experience			0.0215*** (0.00561)	-0.0220* (0.00879)
Overconfidence x Experience				0.0838*** (0.0112)
Constant	0.642† (0.362)	0.393*** (0.112)	0.505*** (0.110)	0.525*** (0.106)
Industry dummy	yes	yes	yes	yes
Observations	2,108	2,108	2,108	2,108
Number of firms	1,080	1,080	1,080	1,080
Wald test	-	33.370***	14.739***	134.238***

Dependent variable: Percentage change in ROA.

Standard errors in parentheses.

*** p<0.001, ** p<0.01, * p<0.05, † p<0.1

GLS regressions with panel-specific heteroscedasticity corrections.

2.4.3. Robustness Checks

This study has two potential sources of bias. One possible issue is the way we measure CEOs' experience. In our main analyses, this variable only considers whether the CEO was in the same position at the same firm during a previous crisis. In this section, we add alternative definitions for experience. *Experience 2* considers a CEO experienced if he/she has been the CEO of a different firm in the same industry during a previous crisis. *Experience 3* eases this restriction further, and counts as experienced any executive who has been the CEO of any firm during a previous crisis.

Table A.1. and A.2. of the appendix show that if we change our measurement of experience, the model loses significance. Two important conclusions emerge from this robustness test. First, experience with recessions is a significant moderator of overconfidence only when it refers to previous experience at exactly the same firm. Having experienced a recession's effects on a specific firm can give its CEO a preliminary idea of how the market will react to a crisis, encouraging them to embrace best practices to improve performance. We posit that knowing the firm and its industry well reduces the level of uncertainty in the decision-making process, which is fundamental for improving performance. Furthermore, recessions have heterogeneous effects on different firms and industries; therefore, having experienced a recession on a specific firm might not be of much help for the CEO to get through another recession in a different company. Another important issue is that Execucomp only has information available from 1992; therefore we can only include two recessions, which implies that the number of observations drops when using alternative definitions of the variable *Experience*.

A second possible source of bias is M&A activity. These transactions have negative effects on firms' performance (King, Dalton, Daily, and Covin, 2004), and overconfident CEOs are more likely to conduct M&A processes (Malmendier and Tate, 2008). Hence, the negative effects of overconfidence on firms' performance could be partially explained by the higher rates of M&A transactions at these firms, rather than the independent effect of this psychological trait. We include an M&A control variable in each model to avoid this issue; in this section, we also test the effect of overconfidence on performance during recessions with an alternative sample that excludes all firm-years with M&A transactions. We can conclude that even if we exclude them, overconfidence still negatively affects firms' performance, with the same significance, in periods of economic downturn.

Table A.3. reports the results for the panel-data model used to test H2 excluding the M&A transactions. We provide an R-squared and a Wald test as a measurement of goodness of fit for the model and a comparison between models, respectively. Table A.3. shows that the coefficient of *Overconfidence* in the second model is -0.0416 ($p < 0.1\%$). We can conclude that even if we exclude M&A transactions, overconfidence still negatively affects firms' performance, with the same significance, in periods of economic downturn.

2.5. Conclusions

Recession literature has devoted considerable effort to determining the best strategies for CEOs to implement when navigating a recession. Despite this information, firms still adopt suboptimal or even damaging strategies during recessions, ultimately decreasing their performance. We propose and empirically test that CEOs' overconfidence has negative implications for companies' performance in

economic downturns. The main argument behind this idea is that overconfident CEOs overestimate their companies' returns, which reduces organizational and financial flexibility ahead of a recession and decreases firms' performance once the recession begins. Moreover, we demonstrate that CEOs' past experience with recessions mitigates the negative effect of overconfidence on firms' performance.

We frame our work in the context of the competitive dynamics of an industry. Following this line of investigation, Garcia-Sanchez, Mesquita, and Vassolo (2014) analyze the effects of entry order, isolating mechanisms, and financial flexibility on the positioning of firms during a recession. They conclude that those firms that focus on building cost competitive advantages and financial flexibility improve their performance during a recession. In another study, Chakrabarti, Singh, and Mahmood (2007) empirically show a negative relationship between firms' diversification and performance during a recession. They argue that diversification reduces organizational flexibility and increases exposure to multiple risks. Therefore, we ask what drives firms to diversify or increase their leverage ahead of a recession.

Our research contributes to the literature by introducing overconfidence as an important factor affecting the strategies deployed by CEOs during a recession.

CEOs with previous experience navigating recessions are less willing to take financial risks, overestimate returns, and overinvest, therefore reducing their firms' leverage (Graham and Narasimhan, 2004; Malmendier and Tate, 2005; Malmendier, Tate, and Yan, 2011). Graham and Narasimhan (2004) established that experiencing the Great Depression of the 1930s lowered CEOs' use of debt in subsequent years, but do not show whether these findings remain true for subsequent recessions. We complement this research by showing empirically that experience with prior recessions

mitigates the effects of overconfidence (and not only debt) on performance during subsequent recessions.

We define experience as having served as CEO of the same firm during a prior recession. Our findings show that experience decreases the effects of overconfidence and improves firms' returns. In addition, we argue that the context in which experience is acquired plays an important role. Our results show that experiencing a recession as CEO in a different industry or company does not mitigate the effect of overconfidence or improve firms' returns. Hence, the context in which the CEO experiences a prior recession is a main contributor to the potential of this experience to lower the negative effects of overconfidence.

Consequently, our research has several implications. First, this study shows the importance of the CEO to his/her company, especially in more hostile environments such as recessions. Firms are reflections of their top managers (Chen, Crossland, and Luo, 2015), as their decisions have direct influence on firms' outcomes. In hostile environments, firms need to enhance their reaction capacity and be able to adapt to substantial organizational changes (Chen and Hambrick, 2012). As a result, CEOs are forced to embrace an active role as firms require even more of their leadership and decision-making skills. Despite their importance, few studies have considered the characteristics of the senior-most decision makers in a firm (Chen, Crossland, and Luo, 2015). Our research fills this gap, analyzing how CEOs' overconfidence influence firms' decisions. We empirically show how this CEO's personality trait directly affect the performance of an entire firm during periods of recession, highlighting their importance inside the firm. For this reason, it is important for directors and shareholders to effectively monitor CEOs' managerial discretion over recessions, as

they can produce dramatic changes to the company.

Additionally, our research serves as a warning, suggesting that overconfidence and experience with past recessions should be seriously considered by companies when hiring a CEO. With this in mind, our results not only focus on expected firm outcomes post-crisis, but also on what firms should focus on ahead of recessions.

We acknowledge several limitations. Despite previous validation of our overconfidence variable, there still exist certain concerns regarding this measure. The first potential issue lies in the question of whether the decision to exercise or hold stock options also depends on the expectations of the board of directors and/or investors, as they can influence CEOs' decisions in order to avoid a signal effect to the market (Campbell et al., 2011). A second concern is that the overconfidence measure reflects not only CEOs' decisions but also firms' stock returns, which adds noise to the measurement (Campbell et al., 2011). We have incorporated the variable *Adjusted stock return* to control for this issue. A final concern relates to the inside information that a CEO may have, especially regarding future stock prices, which could bias his or her behavior to exercise stock options (Malmendier and Tate, 2005).

We base our study only on US companies. Since recessions may have different effects on other countries, our results could be difficult to generalize outside the US. Therefore, it would be interesting to see future research exploring whether our results persist in other regions. Additionally, our results provide insights mainly into the negative effect of CEO overconfidence on performance during recessions. In the light of our results, future research could consider the effect of CEO overconfidence in a broader economic context.

In spite of these limitations, our study is among the first to provide a

comprehensive theoretical approach to and empirical tests of the effects of recessions on firms with overconfident CEOs at the business strategy level. Our findings complement Ho et al.'s (2016) work on overconfidence and financial crises, which is based only on data for the financial industry. Furthermore, we introduce the effect of CEOs' experience, showing its moderating effect on overconfidence.

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APPENDIX

Table A.1. Robustness of the Experience Measure – Alternative One

VARIABLES	(1)	(2)	(3)	(4)
CEO's age	-0.355** (0.112)	-0.296*** (0.0238)	-0.307*** (0.0250)	-0.310*** (0.0267)
CEO's gender	-0.110 (0.0872)	-0.0165 (0.0297)	-0.0189 (0.0296)	-0.0193 (0.0304)
CEO's salary intensity	0.00186 (0.00244)	0.00142 (0.00151)	0.00128 (0.00151)	0.00115 (0.00153)
CEO's share ownership	0.000407 (0.000409)	0.000433*** (6.46e-05)	0.000396*** (7.03e-05)	0.000350*** (7.52e-05)
Adjusted stock return	0.0898 (0.0955)	0.124*** (0.0179)	0.122*** (0.0178)	0.119*** (0.0181)
Bankruptcy	0.181 (0.219)	0.0910 (0.154)	0.0874 (0.154)	0.0896 (0.152)
Change in leverage	0.00154 (0.00296)	0.000488 (0.00133)	0.000681 (0.00133)	0.000557 (0.00137)
Days sales outstanding	-8.25e-05 (9.30e-05)	-6.61e-05* (3.29e-05)	-6.43e-05† (3.28e-05)	-6.75e-05* (3.35e-05)
Firm size	0.0363*** (0.0109)	0.0290*** (0.00211)	0.0291*** (0.00212)	0.0274*** (0.00232)
Mergers and acquisitions	-0.0161** (0.00574)	-0.0144*** (0.00123)	-0.0145*** (0.00118)	-0.0144*** (0.00113)
Tobin's Q	0.00785 (0.0146)	0.00235 (0.00330)	0.00323 (0.00328)	0.00281 (0.00325)
Herfindahl index	0.240 (0.487)	0.120 (0.0979)	0.112 (0.0981)	0.0998 (0.0931)
Change in interest rate	0.497*** (0.129)	0.507*** (0.0203)	0.506*** (0.0201)	0.506*** (0.0179)
Overconfidence		0.000403 (0.00547)		-0.0102 (0.00639)
Experience 2			0.0112 (0.00686)	-0.00644 (0.0105)
Overconfidence x Experience 2				0.0328** (0.0126)
Constant	1.264** (0.466)	1.176*** (0.118)	1.216*** (0.122)	1.252*** (0.128)
Industry dummy	yes	yes	yes	yes
Observations	1,547	1,547	1,547	1,547
Number of firms	882	882	882	882
Wald test	-	0.005	2.655	10.592**

Dependent variable: Percentage change in ROA

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05, † p<0.1

GLS regression with panel-specific heteroscedasticity

Table A.2. Robustness of the Experience Measure – Alternative Two

VARIABLES	(1)	(2)	(3)	(4)
CEO's age	-0.355** (0.112)	-0.296*** (0.0238)	-0.307*** (0.0250)	-0.308*** (0.0272)
CEO's gender	-0.110 (0.0872)	-0.0165 (0.0297)	-0.0187 (0.0296)	-0.0190 (0.0304)
CEO's salary intensity	0.00186 (0.00244)	0.00142 (0.00151)	0.00127 (0.00151)	0.00112 (0.00154)
CEO's share ownership	0.000407 (0.000409)	0.000433*** (6.46e-05)	0.000400*** (7.02e-05)	0.000346*** (7.58e-05)
Adjusted stock return	0.0898 (0.0955)	0.124*** (0.0179)	0.121*** (0.0178)	0.118*** (0.0182)
Bankruptcy	0.181 (0.219)	0.0910 (0.154)	0.0872 (0.154)	0.0902 (0.151)
Change in leverage	0.00154 (0.00296)	0.000488 (0.00133)	0.000675 (0.00133)	0.000561 (0.00138)
Days sales outstanding	-8.25e-05 (9.30e-05)	-6.61e-05* (3.29e-05)	-6.46e-05* (3.29e-05)	-7.05e-05* (3.37e-05)
Firm size	0.0363*** (0.0109)	0.0290*** (0.00211)	0.0289*** (0.00212)	0.0271*** (0.00234)
Mergers and acquisitions	-0.0161** (0.00574)	-0.0144*** (0.00123)	-0.0144*** (0.00118)	-0.0146*** (0.00111)
Tobin's Q	0.00785 (0.0146)	0.00235 (0.00330)	0.00321 (0.00328)	0.00279 (0.00325)
Herfindahl index	0.240 (0.487)	0.120 (0.0979)	0.113 (0.0982)	0.0981 (0.0947)
Change in interest rate	0.497*** (0.129)	0.507*** (0.0203)	0.506*** (0.0201)	0.507*** (0.0176)
Overconfidence		0.000403 (0.00547)		-0.0136* (0.00638)
Experience 3			0.0102 (0.00681)	-0.0137 (0.0105)
Overconfidence x Experience 3				0.0445*** (0.0127)
Constant	1.264** (0.466)	1.176*** (0.118)	1.216*** (0.122)	1.250*** (0.130)
Industry dummy	yes	yes	yes	yes
Observations	1,547	1,547	1,547	1,547
Number of firms	882	882	882	882
Wald test	-	0.005	2.257	16.335***

Dependent variable: Percentage change in ROA

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05, † p<0.1

GLS regression with panel-specific heteroscedasticity

Table A.3. Robustness of Merger and Acquisition Activity

VARIABLES	(1)	(2)	(3)	(4)
CEO's age	-0.270*** (0.0239)	-0.225*** (0.0227)	-0.281*** (0.0241)	-0.282*** (0.0161)
CEO's gender	-0.0593* (0.0261)	-0.0581* (0.0259)	-0.0575* (0.0260)	-0.0665** (0.0237)
CEO's salary intensity	0.000454 (0.000399)	0.000508 (0.000352)	0.000415 (0.000427)	0.000448 (0.000364)
CEO's share ownership	0.000506*** (8.02e-05)	0.000544*** (7.55e-05)	0.000415*** (9.08e-05)	0.000589*** (5.49e-05)
Adjusted stock return	0.0195** (0.00711)	0.0146* (0.00741)	0.0190** (0.00680)	0.0192** (0.00678)
Bankruptcy	0.0476 (0.0910)	0.0456 (0.0897)	0.0493 (0.0901)	0.0639 (0.0819)
Change in leverage	0.00510* (0.00224)	0.00494* (0.00225)	0.00409† (0.00227)	0.00508* (0.00217)
Days sales outstanding	-3.84e-05 (2.76e-05)	-3.00e-05 (2.72e-05)	-2.81e-05 (2.69e-05)	-4.98e-05† (2.60e-05)
Firm size	0.0241*** (0.00210)	0.0253*** (0.00193)	0.0239*** (0.00211)	0.0275*** (0.00159)
Tobin's Q	0.00806*** (0.00141)	0.00926*** (0.00147)	0.00809*** (0.00132)	0.0107*** (0.00173)
Herfindahl index	0.247*** (0.0453)	0.264*** (0.0428)	0.222*** (0.0455)	0.225*** (0.0377)
Change in interest rate	0.0902*** (0.0169)	0.0904*** (0.0165)	0.0999*** (0.0174)	0.0855*** (0.0153)
Overconfidence		-0.0416*** (0.00507)		-0.0754*** (0.00559)
Experience			0.0254*** (0.00657)	-0.0409*** (0.00683)
Overconfidence x Experience				0.123*** (0.0117)
Constant	0.605*** (0.101)	0.407*** (0.0913)	0.662*** (0.0986)	0.618*** (0.0816)
Industry dummy	yes	yes	yes	yes
Observations	1,684	1,684	1,684	1,684
Number of firms	968	968	968	968
Wald test	-	67.150***	14.997***	214.933***

Dependent variable: Percentage change in ROA

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05, † p<0.1

GLS regression with Panel-specific heteroscedasticity

VARIABLES	All years	All years (%)	Recession years	Recession years (%)
All data	4899/11774	41.6%	868/1905	45.6%
Mergers and Acquisitions	1203/2586	46.5%	185/367	50.4%
Bankruptcies	13/41	31.7%	2/9	22.2%