Shaping Organizational Outcomes through Management Control Systems: Evidence from the Field

A dissertation presented

by

Wei Cai

in partial fulfillment of the requirements

for the degree of

Doctor of Business Administration

Harvard University

Graduate School of Business Administration

Cambridge, Massachusetts

May 2020

www.manaraa.com

© 2020 Wei Cai
All rights reserved.

www.manaraa.com

Dissertation Advisor: Professor Dennis Campbell Wei Cai

Shaping Organizational Outcomes through Management Control Systems: Evidence from the Field

ABSTRACT

The management accounting literature investigates the role of control systems in maximizing organizational performance by facilitating managerial decision-making and shaping employee behaviors. Despite the use of diverse management control systems in practice, there is a lack of systematic empirical evidence that examines their effectiveness and (un)intended consequences. In my dissertation, I study the use of different management control systems and their effect on organizational performance by using proprietary data from different organizations. Thereby, my work contributes to the literature on the design of management control systems that can inform corporate leaders and managers on how to deliberately shape organizational outcomes.

www.manaraa.com

ACKNOWLEDGEMENTS

This dissertation would not be possible without the invaluable guidance and support from my committee. I am extremely grateful and would like to express my deepest appreciation to Dennis Campbell, my dissertation chair, for always encouraging me to achieve more than I thought would be possible, for shaping my understanding of what is impactful research, and for guiding me through all hardships; Tatiana Sandino for always being incredibly patient, generous and helpful in mentoring me through every stage of my dissertation, and for inspiring me by her diligence, passion and authenticity about research; and Susanna Gallani for always believing in me and giving me the courage to proceed with my research ideas, and for her endless support and care in every single way. For their kindness, warmth and mentorship, I am forever thankful.

In addition to my committee members, several other professors have been instrumental in my development as a scholar. I want to extend my sincere thanks to Suraj Srinivasan and Charles Wang for taking a chance on me by admitting me into the HBS doctoral program and for supporting me generously throughout my doctoral years; Ryan Buell for always energizing me with his positivity and understanding; Jasmijn Bol for encouraging me to pursue my research interests and for always caring about me as a person; and Bob Kaplan for igniting my passion in my research path and for being a true inspiration to me. I am also grateful to all the faculty in the Accounting and Management unit for their feedback, suggestions and positive impact. I thank all the staff in the Accounting and Management unit and in the Doctoral Programs Office for their patience, help and support, especially Sophie Wylen, Sarah Gazzaniga, Sarah Wallingford, Becca DeGrace, Jen Mucciarone, Angela Valvis, Marais Young and Kathy Randel.

I am deeply grateful to my wonderful friends for their constant support and encouragement – especially, Jee-Eun Shin whose Chihiro-like soul has inspired and warmed me as the best

www.manaraa.com

coauthor and friend one could ever ask for, and has made me a better person; Yuan Zou who has always been there for me in every way, and has fueled my doctoral life with energy, fun and hope; Alexa Scherf and Matt Shaffer who shared the office with me, and could always be counted on as my ad-hoc listeners; and Jihwon Park who has navigated through the entire program with me, and has witnessed both joyful and painful moments together. I am also greatly thankful to Shelley Li, Carolyn Deller, Akash Chattopadhyay, Rajesh Vijayaraghavan, Ruidi Shang and Jody Grewal for their generous advice and support. I thank all the other doctoral students with whom I shared time in the program.

I would have not started this journey if it weren't for Xiaojing Meng and Stephen Ryan at New York University who steered me in this direction. I am forever indebted to Xiaojing for introducing me to accounting academia and always being so supportive in the past five years, and to Stephen for kindly having me in his doctoral class, guiding me patiently and having faith in me that I could, one day, become a researcher.

Finally, I am most grateful to my parents, my mother Limin Chen and my father Huiping Cai, for shaping my life with courage, genuineness and compassion, and for loving me just as I am. I also want to thank my grandfathers, Xinhai Chen and Youlin Cai, for being my role models, and for showing me that gratitude and dedication are values to live by. Both lost their lives during my doctoral years, but, at this special moment, I still feel their presence and hope I make them proud.

To my family, I dedicate this dissertation.

www.manaraa.com

TABLE OF CONTENTS

www.manaraa.com

www.manaraa.com

LIST OF TABLES

www.manaraa.com

LIST OF FIGURES

www.manaraa.com

CHAPTER 1

Introduction

My first essay studies management control systems intended to diffuse organizational culture. Specifically, I study an organization that introduced a formal management control system to systematically measure and select employees whose values are aligned with those of the organization. I exploit the staggered feature of the implementation of the system, and find that, on average, employees selected with the system perform significantly better than those selected without the system. However, the performance consequences from adopting the system vary significantly depending on (1) the interaction with the existing subculture, (2) the extent of shared responsibility among employees in the work environment, and (3) the noise in the measurement of culture-fit due to gaming behavior of applicants. Taken together, these findings have important implications for the design of formal management control systems that aim to facilitate the diffusion of organizational culture.

My second essay with Susanna Gallani and Jee-Eun Shin explores how the design of incentive contracts for employees' standard execution tasks influences their propensity to engage in innovative activities. Incentive contracts for front-line employees generally specify explicit performance measures for the tasks included in their main responsibilities. Yet, organizations often encourage employees to engage in desirable behaviors that extend beyond their assigned standard execution tasks. Using data from a manufacturing company that encourages their employees to engage in employee-initiated innovation, we show that high-powered incentives are associated with fewer innovation idea submissions. This result is driven by idea submissions of broader scope that consider improvements encompassing multiple stakeholders within the organization rather than those that are narrowly defined around the employee's assigned standard task. Our findings

www.manaraa.com

suggest that high-powered incentives increase the pressure to deliver on performance measures explicitly included in incentive contracts, thereby limiting the scope of employee-initiated innovation to task-specific suggestions. These findings contribute to the literature on the unintended consequences of pay-for-performance compensation contracts.

My third essay with Susanna Gallani and Jee-Eun Shin examines the performance consequences of using managerial discretion in a management control system when compensation payoffs are interdependent; that is, when compensation decisions made with respect to some employees have spillover effects on others. We use proprietary data from a company where management provides monthly rewards and penalties only to the best and worst performers. We find evidence for a nominal effect from applying managerial discretion in that the subsequent performance of workers who received rewards or penalties is affected. We also find evidence for an opportunity effect from applying managerial discretion in that the subsequent performance of workers who missed out on the rewards or penalties is affected. In further tests, we show that these performance effects likely stem from a combination of economics-based and psychology-based reasons. These findings provide important insights for the design of incentive systems involving managerial discretion.

www.manaraa.com

CHAPTER 2

Formalizing the Informal: Adopting a Formal Culture-fit Measurement System in the Employee Selection Process

"The only thing of real importance that leaders do is to create and manage culture. If you do not manage culture, it manages you, and you may not even be aware of the extent to which this is happening."

In Organizational Culture and Leadership (1985) by Edgar Schein

2.1. Introduction

Prior research in accounting, economics, and management suggests the important role of organizational culture as an *informal* control mechanism that induces desirable organizational outcomes (e.g., Campbell 2012; Gibbons and Henderson 2013).[1] However, organizations also rely on *formal* management control systems to deliberately and consistently shape their organizational culture as organizations grow and/or as organizations become more decentralized.[2, 3] While prior management accounting literature on formal management control systems has largely focused on the role of performance measurement and incentive systems in motivating employees to achieve organizational goals (e.g., Merchant and Van der Stede 2007; Bol and Loftus 2018), the role of formal control systems in managing organizational culture remains significantly understudied.

[1] Informal control in this study refers to the unwritten and uncodified forms of mechanisms to eliminate goal incongruence between employees and the larger organization (Ouchi 1979; Eisenhardt 1985; Cardinal et al. 2004). The literature variously describes such informal control as organizational culture and clan control (e.g., Ouchi 1979; North 1991; Graham et al. 2017). Organizational culture in this study is defined as shared beliefs and values (Schein 1985; Van den Steen 2010).

[2] Formal management control systems in this study are defined as "formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities" (Simons 1994).

[3] Shaping/managing organizational culture in this study refers to the management practice by which the top management team tries to instill espoused values among its employees to strive for common organizational objectives. In fact, a survey-based study conducted by Deloitte documents that "[a] staggering number of companies—over 50 percent in this year's survey—are currently attempting to change their culture in response to shifting talent markets and increased competition" (https://trendsapp.deloitte.com/reports/2016/global-human-capital-trends/shape-culture.html).

www.manaraa.com

This paper contributes by examining the employee performance consequences of adopting a formal culture-fit measurement system in the employee selection process that systematically measures and selects applicants who are aligned with the organizational values that the corporate leaders want to instill in the organization (i.e., culture-fit).[4, 5]

The employee performance consequences of implementing a formal culture-fit measurement system in the employee selection process are unclear. On the one hand, employee selection processes are widely considered to be a key factor in shaping organizational culture. Prior theoretical literature posits that management control systems emphasizing alignment on values via employee selection may lead to better organizational outcomes than systems emphasizing alignment on incentives via contracts.[6] Hiring employees whose values are already in line with the organizational values may reduce many agency costs (such as contracting or monitoring costs) associated with improving incentive alignment between the organization and its employees. In fact, many organizations expend considerable resources in the hiring process to evaluate applicants' alignment with organizational values.[7]

On the other hand, whereas the adoption of a formal culture-fit measurement system may improve the alignment of selected employees' values with organizational values, there are several reasons to believe that adopting a *formal* system may not be as effective as expected. First, in settings such as decentralized organizations, in which local offices may have organically

[4] In this study, the terms "(formal) culture-fit measurement system," "culture-fit system," and "culture-fit test" are used interchangeably. The details are described in Section 2.3, which elaborates on the research setting.
[5] Culture-fit in this study is defined as the individual's values being aligned with organizational values, which shares the same meaning as "values-fit" or "values alignment". I use the term "culture-fit" following the terminology used at my research site.
[6] For example, see Akerlof and Kranton (2000, 2005), Simons (2000), Van den Steen (2005, 2010), Merchant and Van der Stede (2007), and Prendergast (2007).
[7] Based on a study conducted by the Society for Human Resource Management (SHRM), Katie Bouton wrote in a *Harvard Business Review* article that poor culture fit can cost an organization between 50% and 60% of the employee's annual salary (https://hbr.org/2015/07/recruiting-for-cultural-fit).

www.manaraa.com

developed subcultures, a new employee selected through a formal culture-fit measurement system may experience a "culture clash" (Van den Steen 2010) if the existing subculture is not itself aligned with the espoused organizational values, thus eroding the benefit of adopting the system.[8] Second, an integral part of maintaining and diffusing an organizational culture is the shared responsibility among individuals within the organization to strive for organizational values (e.g., Edmondson 1999; Rhoades and Eisenberger 2002; Simons 2005; Gibbons and Henderson 2013).[9] In other words, in settings where there is a lack of sufficient organization-level support in the work environment to embrace the organizational values, the effectiveness of the culture-fit measurement system may be undermined. Third, the implementation of a formal culture-fit measurement system during the employee hiring process may trigger applicants' gaming behavior in that applicants whose values are not aligned with organizational values may exert effort to maximize their score on the culture-fit test by hiding their true type. If such efforts are successful, the adoption of a formal culture-fit measurement system in the employee hiring process may be subject to noisy measurement of culture-fit and may select a different type of employee into the organization than intended.

I use proprietary data from a highly decentralized organization in which there is a distinct management control problem—maintaining organizational culture consistently across its dispersed offices. In an effort to hire employees who are aligned with organizational values, the organization adopted a formal culture-fit measurement system across its offices starting in 2012, in which candidates are required to answer multiple-choice questions about how they would

[8] In multi-unit organizations, employees may work within various functional teams and/or diverse geographic locations. A local subculture refers to the shared beliefs and values about the best way of doing things that have developed in such silos.

[9] In this study, I define "shared responsibility" as joint commitment and effort to provide support in the work environment so that members of the organization feel comfortable and encouraged to embrace organizational values.

www.manaraa.com

behave under hypothetical scenarios.[10] My empirical identification strategy relies on the staggered feature of the implementation process of this system across its offices, whereby I can compare the performance of employees selected through the system at offices where it has been implemented (Treated) with that of employees at other offices where the system has not yet been implemented (Control). The variation in implementation times within the organization is plausibly exogenous due to unexpected operational reasons.[11] This research setting allows me to (1) examine whether the adoption of a culture-fit measurement system leads to the selection of better-performing employees and (2) examine cross-sectional differences in such effects based on the existing subculture, the extent of shared responsibility in the employee's work environment, and the noise in the measurement of culture-fit due to candidates' gaming behavior.

First, I find that, on average, employees selected with the culture-fit measurement system perform significantly better than those selected without the system. This empirical finding is consistent with the prior theoretical prediction that culture fit is associated with positive employee outcomes. I also examine how these differential performance effects evolve over time, and find no significant difference in performance in the first year of hire, regardless of whether employees were selected through the system or not. However, employee performance starts to diverge in the second year after their hire, and such performance differences become increasingly pronounced as the employee's years at the firm accumulate. These latter results corroborate the theoretical prediction that culture fit may be associated with unobservable characteristics influencing

[10] My research site is a Chinese agri-business firm with over 200 offices nationwide. However, the adoption of similar measurement systems for culturally aligned employees is widespread across countries. For example, many companies use software such as the HT Culture Analytics and Recruiting Platform, instaTalent, Moonshot Insights, Gallup, and Harver, which are designed to measure culture fit for various HR functions (e.g., employee selection, assessment).
[11] Initially, two human resources executives were responsible for the adoption of the culture-fit measurement system. However, right before the implementation of the system, one of them left the firm unexpectedly for personal reasons; adoption in some offices was then delayed until a new human resources executive joined the firm. Details are given in Section 2.4.

www.manaraa.com

performance in the long term, rather than simply capturing ability or skills which would be expected to have more immediate performance effects.

Second, to explore the cross-sectional variation of the performance consequences of a culture-fit measurement system, I proxy for the existing subculture and the extent of shared responsibility in the employee's work environment using employee survey data. I show that, in offices where current employees are poorly aligned with organizational values, the performance of employees hired with the system is significantly worse than that of those hired without the system. This finding lends support for the theorized negative implications of a culture clash, as in Van den Steen (2010). Moreover, in offices where employees feel relatively more supported by senior leaders, supervisors, and colleagues, the performance of employees hired with the system is significantly better than that of those hired without the system. This finding is consistent with the importance of shared responsibility among employees in the work environment. Lastly, I make use of a credibility score generated by the culture-fit test as a proxy for the noise in the measurement of culture-fit due to gaming behavior of the candidates.[12] My findings show that the performance effect of culture fit is more pronounced for employees associated with relatively higher credibility scores, which suggests that the extent of potential gaming behaviors of applicants can be predictive of their subsequent work performance within the organization.

I also conduct several additional tests to corroborate my main findings. First, I validate the effectiveness of the culture-fit measurement system by conducting a cross-sectional analysis based on the variation in the culture-fit score. The result shows that the performance effect is, on average, more pronounced when employees have higher culture-fit scores, providing confidence that the

[12] The credibility score roughly captures the extent to which candidates answer the questions truthfully. It incorporates two considerations: the consistency of the individual's answers and the potential for a social desirability bias. Details are given in Section 2.3.1.

www.manaraa.com

culture-fit measurement system credibly measures attributes that the organization believes to result in positive outcomes. Second, prior research (e.g., Campbell 2008; Deller 2017) suggests that promotion and turnover decisions within organizations entail information beyond performance-related aspects. To test this conjecture, I also examine promotion and turnover decisions. My findings suggest that past performance constitutes a primary factor in influencing employee promotion and turnover decisions, but that the extent of culture-fit alignment exhibits incremental explanatory power for promotion decisions, but not for turnover decisions. Finally, I also conduct several analyses to address potential concerns related to my empirical identification strategy and show that my results are robust.

This study contributes to the literature on formal management control systems. Prior literature has predominantly focused on the role of formal management control systems in performance measurement and incentive systems to motivate employees to achieve organizational goals (e.g., Banker et al. 1996; Banker et al. 2000; Merchant and Van der Stede 2007; Bol and Loftus 2018). Despite the fact that firms increasingly use formal management control systems to manage informal management practices, such role of formal management control systems has been scantly studied. This study examines the adoption of a formal management control system to shape organizational culture through selecting employees who are aligned with organizational values.

Second, I extend the literature on employee selection as a control system. Following the long-standing theoretical research regarding the role of aligning values between employees and organizations, a recent stream of empirical research shows that employee selection can be an effective way to increase alignment on values (e.g., Chatman 1989; Campbell 2012; Abernethy et al. 2015; Swaney 2017; Deller and Sandino 2018; and Liu et al. 2018). These studies focus on traditional means—such as referrals, interviews, and internships—to select better-aligned

www.manaraa.com

employees. However, these traditional means may be subject to limitations—such as idiosyncratic preferences, limited capacity to assess a large number of candidates, and difficulty in differentiating cultural alignment from other traits such as knowledge, skills, and expertise. Referrals, interviews, internships may be subject to some or all of these limitations which may make it difficult to diffuse these as hiring practices in large decentralized organizations. This study examines an alternative approach—incorporating a formal culture-fit test in the employee selection process—that can provide candidate information that can be verified by the organization, can allow for the possibility to consider a larger applicant pool, and can help to distinguish culture fit from other traits of employee characteristics.

Third, I contribute to the literature on the interrelationship of different types of control (Prendergast 2009; Grabner and Moers 2013; Abernethy et al. 2015). These studies examine how and under what conditions different types of control mechanisms can act as complements or substitutes. The findings of my cross-sectional tests highlight that the efficacy of a formal culture-fit measurement system in the employee selection process is highly dependent on the nature of the work environment. Despite abundant theoretical research on the benefits of culture fit, I find that systematically hiring high-culture-fit employees requires sufficient shared responsibility amongst employees to reach its full potential. More importantly, if the work environment exhibits an existing subculture that clashes with organizational values, employees selected with the system may perform even worse than those selected without the system. These findings highlight the importance of a more holistic approach to the design of management control systems that are complementary to each other (Grabner and Moers 2013; Bol and Loftus 2018).

This study also speaks to the difficulty of diffusing organizational culture in practice. An increasing number of studies in economics, accounting, and management highlight the difficulties

www.manaraa.com

in explaining persistent performance differences among similar enterprises and attribute those differences to heterogeneity of organizational culture (e.g., Gibbons and Henderson 2013). One of the reasons why such performance discrepancies persist is due to the difficulty of shaping or diffusing the desirable organizational culture. My findings suggest that the implementation of a formal culture-fit measurement system in the employee hiring process can potentially alleviate difficulties in instilling organizational values by improving the employee selection process. More importantly, this study highlights the conditions under which such a system can be more effective in facilitating the diffusion of organizational culture.

The remainder of the paper is organized as follows. In Section 2.2, I review the prior literature and develop my hypotheses. Section 2.3 describes my research setting and data. Section 2.4 explains the empirical methodology. Section 2.5 tests my hypotheses and provides the empirical results. In Section 2.6, I present results from additional tests. I conclude with Section 2.7.

2.2. Hypothesis Development

2.2.1. Employee Selection with a Culture-fit Measurement System

Prior literature in accounting, economics, and management highlights the importance of organizational culture in inducing desirable organizational outcomes.[13] In particular, a strand of analytical work emphasizes the role of employee alignment with organizational values in driving organizational performance. For example, Akerlof and Kranton (2000, 2005) define "identity" as a person's sense of self and argue that employees that exhibit high identity alignment with the

[13] For example, see Ouchi (1979), Kreps (1990), O'Reilly et al. (1991), Hermalin (2000), Campbell (2012), Gibbons and Henderson (2013), Davidson et al. (2015), Guiso et al. (2006, 2015a, 2015b), Graham et al. (2017), and Bushman et al. (2018).

www.manaraa.com

organization behave more in concert with the goals of their organizations. They show that a worker who identifies with his or her firm is willing to make a high rather than a low effort with only minimal variation in wage. Van den Steen (2005) emphasizes the notion of "alignment of beliefs" among employees as a way to increase their effort and utility, also resulting in improved coordination to attain organizational objectives. Moreover, Van den Steen (2010) demonstrates how agency problems can be mitigated by reducing differences in objectives in organizations where employees exhibit "shared values".[14]

Despite the importance of organizational culture as a significant driver in explaining organizations' competitive advantage and organizational success, many concur that shaping or diffusing a desirable organizational culture is difficult. In the early stages of a firm's life cycle, the role of the founding team is crucial in shaping organizational culture by clearly defining common organizational objectives to strive for, and by setting examples of behaviors consistent with espoused values that can guide the employees. The challenges of maintaining an organizational culture become particularly evident as the organization grows or as the organization becomes decentralized (Campbell and Sandino 2019). Whereas operational management practices consist of explicit guidelines that can be copied to fuel organizational expansion (Bloom and Van Reenen 2007; Gibbons and Henderson 2013), an organizational culture largely consists of "unwritten codes of conduct" (Baker et al. 2002) that are hard to accurately codify, and thus, making it difficult to replicate and/or diffuse.

In fact, the challenges associated with shaping organizational culture are widely echoed by practitioners in the field. A survey of corporate executives by Graham et al. (2017) highlights the

[14] According to Van den Steen (2010), most of the theory on culture applies to both "culture as shared beliefs" and "culture as shared values". The difference between "beliefs" and "values" is not the emphasis of this study.

www.manaraa.com

importance of shaping culture as a key driver of organizational performance. The authors state that "over half of senior executives believe that corporate culture is a top-three driver of firm value and 92% believe that improving their culture would increase their firm's value" (p. 2). However, they also find that organizations face significant challenges in shaping their organizational cultures. Only 16% of the surveyed executives respond that "their culture is where it should be" (p. 3). Accordingly, many organizations expend resources to develop management practices that can shape a desirable organizational culture.

There are two distinct ways to approach the problem, depending on whether one believes that shaping an organizational culture is predominantly a matter of *nurture* or of *nature*. Whereas management control systems meant to shape organizational culture through nurturing emphasize the design of incentive systems that tie formal measures to compensation or other internal management practices (Gibbons and Kaplan 2015), those meant to shape culture through nature emphasize hiring efforts to select employees inherently aligned with organizational values (Campbell 2012).[15, 16] This paper clearly focuses on the latter approach, and examines the adoption of a formal culture-fit measurement system in the employee selection process.

[15] An example of managing culture through *nurturing* is provided in a Harvard Business School teaching note (Campbell and Sandino 2019) that describes how Southwest Airlines shapes its organizational culture through assessments: "As at Southwest, the assessment systems in strong-culture organizations tend to emphasize how (not just whether) results are achieved and, in many cases, measure this performance characteristic quite directly. For example, so-called '9-box' systems are used commonly to assess employees on both traditional performance (such as reaching sales or profit goals) and on the extent to which they pursue their goals in ways that are consistent with the organization's intended culture. In effect, these types of systems measure employees on the dimensions of both performance and cultural fit" (p. 7).

[16] The Southwest Airlines case also provides an example of managing culture via the *nature* role of management control systems: "For example, to effectively screen for the trait of empathy in job candidates, a Southwest interviewing team asks a group of potential employees to prepare a five-minute presentation about themselves and gives them plenty of time to prepare. As the presentations are delivered, the interviewers do not watch just the speakers; they watch the audience to see which applicants are using this time to work on their own presentations and which are enthusiastically cheering on and supporting their potential coworkers. Unselfish people who will support their teammates are the ones who catch Southwest's eye" (Freiberg and Freiberg 1998, p. 68).

www.manaraa.com

Studies examining the design of *formal* management control systems to assess culture fit in employee selection are relatively scant.[17] Due to the inherent difficulties of measuring culture fit, organizations have primarily relied on relatively traditional means such as referrals, interviews, and internships (e.g., Resick et al. 2007; Zhao and Liden 2011; Campbell 2012; Rivera 2012; Liu et al. 2018). For example, using data from a federal credit union, Campbell (2012) examines referrals as a proxy for the selection of employees who are better aligned with organizational values. He finds that employees hired through referral channels are more likely to use decision-making authority in granting customer loans and to make less risky decisions than those who were not. Liu et al. (2018) study a fit-focused interview program and show that employees selected with such a program perform better than those selected without the program. Resick et al. (2017) find that, in a 12-week internship program, interns with greater organizational fit are more likely to be retained by the firm.

The adoption of a formal culture-fit measurement system in the employee selection process may bolster the benefits associated with traditional hiring efforts to select more aligned employees. First, unlike other hiring channels—such as interviews and internships, through which only a limited pool of candidates can be evaluated—a formal culture-fit measurement system has a higher capacity to assess a broader pool of candidates at a relatively low incremental cost. Second, the absence of a formal measurement system in the traditional hiring channels makes it difficult to verify whether a new hire is legitimate (Rivera 2012; Hoffman et al. 2018). In contrast, a formal culture-fit measurement system can make the organization less reliant on idiosyncratic preferences

[17] An exception is Hoffman et al. (2018), which examines the introduction of a job test in the employee selection process on candidates' ability and fit for the job including technical skills, personality and cognitive skills. The fundamental insight of this study is that adopting a formal management control system in the employee selection process can mitigate human bias or flawed judgment and can provide information about the candidate quality that can be directly verified by the firm.

www.manaraa.com

or subjective judgment. Third, a formal culture-fit measurement system may help differentiate cultural alignment from other traits such as knowledge, skills, and expertise. For example, when considering referrals, it is difficult to distinguish among the criteria that may have contributed to a final hiring decision (Campbell 2012).

Taking these arguments together, I expect the adoption of a formal culture-fit measurement system in the employee selection process to be associated with improvement in the organization's ability to perform a verifiable and systematic evaluation of job applicants' alignment with organizational values. Consistent with the extant prior analytical research on the benefits of culture fit, I predict that the adoption of a culture-fit measurement system is associated, on average, with the selection of new hires who perform better. I therefore hypothesize:

> ***H1: Employees selected with the culture-fit measurement system perform significantly better than employees selected without the system.***

Yet, there are several reasons to believe that the adoption of a formal culture-fit measurement system in the employee selection process may not result in the anticipated benefits. The performance of new hires is critically influenced by their surrounding work environment. In other words, it is unclear how more stringent *centralized* hiring efforts—those which measure culture fit—may interact with the existing subculture and work environment at *decentralized* offices. Moreover, applicants whose values are not aligned with organizational values may game the system by hiding their true type in the test. I elaborate more on these possibilities in the development of the hypotheses discussed below.

2.2.2. Clash with Existing Subculture

Key business functions become increasingly decentralized as organizations expand. In fact, a main benefit of decentralization in organizations is that managers can develop unique practices

www.manaraa.com

that can cater to their location-specific conditions (Jensen and Meckling 1995). For example, in the context of employee hiring efforts, Deller and Sandino (2018) provide empirical evidence that is consistent with the advantages obtained from manager-specific knowledge. Using data from a company that switched from a decentralized to a centralized hiring model, they show that decentralized hiring efforts were associated with relatively lower employee departure rates in those conditions in which local managers are more likely to possess superior information. Local managers often apply their superior knowledge by developing rather informal management practices which can shape an independent subculture that, in turn, might differ from the organizational values determined centrally by top management.

A formal culture-fit measurement system that is uniformly adopted throughout an organization may result in the systematic selection of a particular type of employee that is most aligned with organizational values. However, if informal management practices at a decentralized location have shaped a subculture that diverges from those organizational values, newly selected employees with the culture-fit measurement system may not fit in with the existing subculture. Indeed, Van den Steen (2010) analytically demonstrates that employees exhibit lower satisfaction and motivation when having to confront others who do not share their values. Moreover, a significant body of research examining drivers of post-merger success suggests that the compatibility of the organizational culture of the merging entities is critical in the integration process and subsequent financial performance (e.g., Cartwright and Cooper 1996; Weber 1996; Larsson and Finkelstein 1999). Accordingly, the consequences of adopting a formal culture-fit measurement system should exhibit variation with respect to the extent to which the existing subculture is aligned with organizational values. In particular, I expect that the benefits of adopting the system will be more pronounced in the absence of a "culture clash." I therefore hypothesize:

www.manaraa.com

H2: The performance consequences of adopting a culture-fit measurement system are more favorable when the existing employees exhibit relatively greater alignment with the organizational values.

2.2.3. Importance of Shared Responsibility

Whereas the culture-fit measurement system may select new hires that exhibit alignment with organizational values on an *individual* basis, a critical element for the diffusion of organizational culture is that such values are *shared* among all individuals throughout the organization. To clarify this difference, it is important to distinguish two components that comprise organizational culture: (1) an understanding of organizational values by the individual constituents; and (2) a joint effort among the constituents to strive for those values. The former may differ across organizations depending on the organization's objectives, but the latter constitutes a common requirement regardless of the idiosyncratic nature of the organization. For example, consider a manufacturing firm and a high-tech firm that exhibit strong organizational cultures. Whereas an important core value for the manufacturing firm may be reliability, the high-tech firm would rather emphasize adaptability as one of its core defining characteristics. Even though the organizational values are different, their organizational culture is able to thrive only if individual employees feel a shared responsibility to strive for them. In this study, I define "shared responsibility" as joint commitment and effort to provide support in the work environment so that members of the organization feel comfortable and encouraged to embrace organizational values.

Various relevant streams of literature highlight the importance of instilling a sense of "shared" responsibility to embracing common organizational values. For example, the economics literature on relational contracts refers to this notion as "credibility." Gibbons and Henderson (2012) argue that an integral part of maintaining and diffusing an organizational culture is to

www.manaraa.com

provide clarity and credibility for organizational values.[18] In particular, their concept of credibility critically hinges on a notion of trust amongst employees within the organization, and requires a sense of shared responsibility amongst organizational constituents. In a similar vein, the literature on organizational learning identifies the construct of psychological safety—"a shared belief held by members of a team that the team is safe for interpersonal risk-taking"— as a critical determinant of team performance (Edmondson 1999, p. 350). Several studies in the management literature argue that the extent to which employees feel supported by the organization constitutes an important factor in achieving desirable organizational outcomes such as greater job commitment and satisfaction (e.g., Babin and Boles 1996; Eisenberger et al. 2002; Rhoades and Eisenberger 2002; Shanock and Eisenberger 2006; Pazy and Ganzach 2009). Organizational support can originate from a variety of sources—including coworkers, supervisors, and senior leaders—so that the notion of having a shared responsibility to strive for common organizational goals is evident. Finally, a growing number of studies in accounting also highlight the role of trust and cooperation among organizational constituents as important factors in the design of successful management control systems (e.g., Coletti et al. 2005; Simons 2005, 2010; Maas et al. 2012). Specifically, Simons (2005) refers to the "span of support"—defined as the amount of help an individual employee can expect from others within the same organizational unit—as a key management control lever within organizations. He notes that policies to widen the span of support—such as broad-based stock ownership plans, team incentive programs, and the articulation of a common mission—are fundamentally aimed at creating a shared purpose and fostering a sense of belonging among employees to strive for a shared goal.

[18] Gibbons and Henderson (2012) define clarity as "the problem of communicating the terms of the relational contract" and credibility as "the problem of persuading others that one is likely to keep one's promises."

www.manaraa.com

Accordingly, I expect that the consequences of adopting a formal culture-fit measurement system will exhibit variation with respect to the extent to which the work environment of the newly-hired employee exhibits a shared responsibility to embrace organizational values. In particular, I expect that the benefits of adopting the system will increase in the extent to which employees feel supported by their surrounding work environment. I therefore hypothesize:

> ***H3: The performance consequences of adopting a culture-fit measurement system are more favorable when the employee's work environment exhibits greater shared responsibility to embrace organizational values.***

2.2.4. Noise in Culture-fit Measurement due to Gaming Behavior

Due to asymmetric information about the value of a candidate possessed by the candidate and by the firm, gaming behavior may arise from the adoption of a formal culture-fit measurement system in that applicants whose values are not aligned with organizational values may expend effort to maximize their score on the fit test instead of revealing their true type. If such efforts are successful, the adoption of a formal culture-fit measurement system in the employee selection process might lead to selecting the wrong type of employees into the organization. In other words, the culture-fit measurement system may not be effective if candidates do not truthfully reveal their values.

Many firms reveal a lot about their culture and organizational values through various voluntary disclosure channels such as their website, annual reports, and executive interviews. If the culture-fit measurement system constitutes an official criterion in the employee selection process, candidates with strong desire to work for the organization have a powerful incentive to create a false impression of being well aligned with the organization's known values. As a result, the implementation of a formal culture-fit measurement system may induce the selection of two different types of employees into the organization: employees may be evaluated as being aligned

www.manaraa.com

with organizational values based on the culture-fit test either (1) due to greater intrinsic alignment, or (2) due to greater efforts to game the system by hiding their true type, and thus inducing perceived alignment. The latter type of employees would be primarily associated with greater measurement error of culture fit due to their gaming behavior. Accordingly, I expect that the benefits of adopting the system will increase in the extent to which there is less noise in measurement due to gaming behavior of employees. I therefore hypothesize:

> ***H4: The performance consequences of adopting a culture-fit measurement system are more favorable when there is less noise in the measurement due to gaming behavior of candidates.***

2.3. Research Setting and Data

The research site for this study is an agri-business company operating in China (hereafter, "ABC"). ABC produces agricultural products (such as seafood, meat, dairy, grains etc.), and distributes them to retail stores where they are sold to the final consumers. Due to the perishable nature of the goods, ABC maintains over 200 offices nationwide to facilitate local production of its agricultural products. Each office maintains the same operational functions: planting, production, breeding, and processing. Other business functions that do not directly relate to the production process—such as human resources, purchasing, finance, research and development, and marketing—are administered at ABC's headquarter. Because ABC's brand is well-known to the end consumers, maintaining brand reputation constitutes an important element for continued success. Top management considers its employees to be the firm's most valuable resource and strives to shape an organizational culture that is aligned with its espoused values to build its brand reputation.

ABC has invested in two major initiatives to maintain and diffuse a consistent organizational culture. First, ABC adopted a formal culture-fit measurement system in its

www.manaraa.com

employee hiring process, beginning in 2012. The aim was to enable for a more systematic approach in the employee selection process that would yield greater marginal return on investment in human capital by expending resources on employees that are aligned with organizational values. Second, ABC also exerted effort in gaining a better understanding of the existing subcultures and work environments at dispersed offices by conducting an employee survey in 2012 before the adoption of the culture-fit measurement system.[19] These surveys were not used as a basis for assigning rewards or penalties to any employees, but rather as a means to measure the status quo of the organizational culture. As described below in more detail, this study exploits both institutional features to examine the performance consequences for newly-hired employees who were selected through the formal culture-fit measurement system.

2.3.1. Implementation of a Culture-fit Measurement System

ABC's organizational objective is to promote long-term and sustainable development. It espouses the following four organizational values as important elements when striving for its organizational goals: simplicity, quality, adaptability, and integrity.[20] ABC also lists these core values on its corporate website. Despite maintaining a clear definition of its core values, these core values constitute rather abstract ideals and principles as opposed to detailed articulations of exemplary employee behaviors under specific working conditions. ABC firmly believes that maintaining a corporate culture in which employees share such values is crucial and emphasizes

[19] The survey was mandatory and anonymous. Anecdotal evidence shows that the average response rate across offices was over 90%.

[20] The company defines simplicity as "making things easier and simplifying complex work," quality as "maintaining consistent high quality to protect the interests of customers," adaptability as "embracing change, seeing change as an opportunity and encouraging innovation," and integrity as "maintaining professional ethics, integrity and honesty."

www.manaraa.com

them in its employee selection process. In an effort to formalize this process, the organization decided to integrate its selection process with a formal culture-fit measurement system.[21]

Culture constitutes a construct that is inherently difficult to define or measure. Moreover, it is possible that different constituents of an organization may have different understandings of what the organizational culture is. In order to extract a uniform definition of culture across the entire organization, ABC decided to take a top-down approach whereby it asked the top management team for a set of organizational values that desirable employees should embrace. To develop a reliable and verifiable measurement system for these espoused values, the organization closely collaborated with a third-party human resource consulting firm to design a culture-fit test that all future job applicants would have to take. Appendix A illustrates each step in the design of the culture-fit measurement system at ABC. This culture-fit test is based on questions that ask the applicant how he or she would behave under various scenarios. It is based on multiple-choice answers that lay out potential alternatives for each scenario, and is designed to be an hour long. A sample question in the culture-fit test is provided in Appendix C.

The culture-fit test generates two scores for each applicant taking the test: a culture-fit score and a credibility score. The culture-fit score that can range from 0 to 100 points is based on the number of answers to the multiple-choice question that match those in ABC's predetermined sample answer key. The credibility score that can range from 0 to 5 incorporates two considerations: the consistency of the individual's answers and the potential for a social desirability bias.[22] In particular, to address the former, the system tracks the applicants' answers to the same hypothetical

[21] Anecdotal evidence suggests that the implementation of the culture-fit measurement system was largely triggered by the desire to maintain a consistent organizational culture across the decentralized offices and by the realization of the large number of job candidates. It was not prompted by macroeconomic factors such as labor market conditions or restructuring efforts. However, due to data constraints, I cannot empirically test this anecdotal evidence.

[22] Fisher (1993) defines social desirability bias as a "systematic error in self-report measures resulting from the desire of respondents to avoid embarrassment and project a favorable image to others" (p. 303).

www.manaraa.com

situations to which they should respond with similar answers if their values are consistent. To address the latter, the system includes additional questions, based on psychology research, to evaluate a respondent's tendency to answer questions in a manner that will be viewed favorably by ABC.[23]

2.3.2. Pre-implementation Survey

ABC believes that the development of an organizational culture requires adequate support from all constituents of the organization with whom an employee has regular interactions with in his or her daily work environment. Prior to the official implementation of the culture-fit measurement system, ABC randomly selected a subset of offices and conducted an employee survey to assess the extent to which existing employees perceive their surrounding work environment to be supportive in striving for organizational values. This survey directly asked respondents to comment on their perceptions related to two different categories: (1) the employee's self-evaluation of his or her alignment with organizational values and (2) the employee's work environment, including his or her interaction with senior managers in the management team, supervisors, and colleagues. The survey was anonymous. Appendix B lists all the survey items included in the pre-implementation employee survey.

2.3.3. Employee Selection Process

ABC's employee selection process consists of two stages. In the first stage, the applicant pool is screened based on CVs. The human resources department is primarily responsible for this

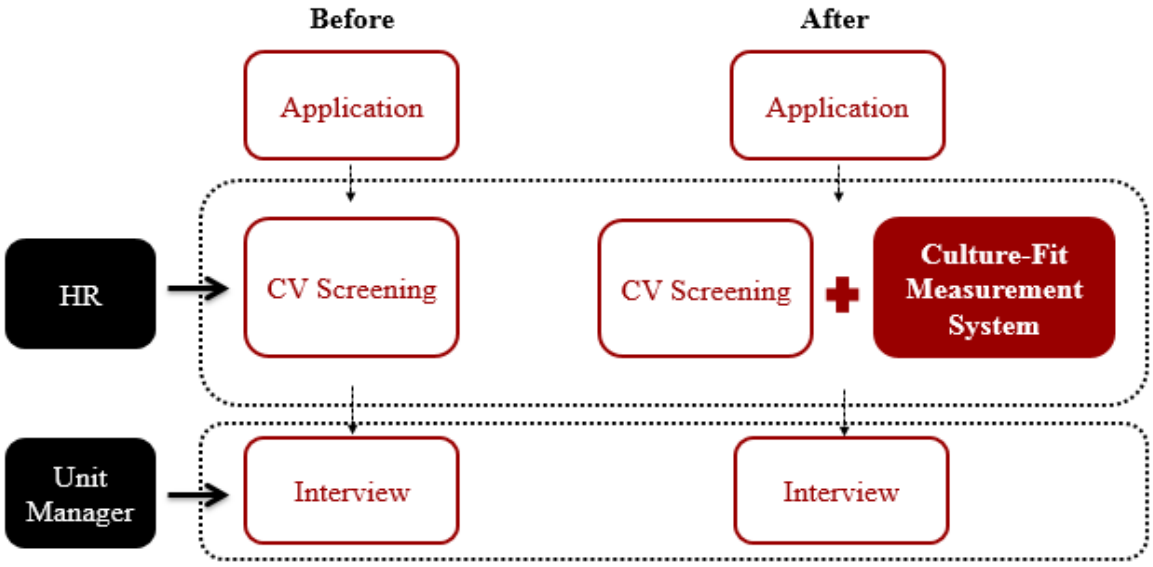
[23] Candidates are asked to read a statement and choose the extent to which they agree with it on a scale of 1 to 5. Sample statements include: "I like to gossip at times," "There have been occasions when I took advantage of someone," "I am always willing to admit it when I make a mistake," and "There have been occasions when I felt like smashing things." These additional questions are mixed with the actual culture-fit questions in the culture-fit test.

www.manaraa.com

process. In the second stage, eligible applicants are then invited to follow-up interviews by unit managers in local offices. The culture-fit test was introduced into the first stage beginning in 2012. The change in the employee selection process is illustrated in Figure 2.1. Human resources department requires a minimum culture-fit score of 40 points and a credibility score that is above 0 to pass the first-stage screening process.[24] Note that, while human resources department uses both culture-fit score and credibility score to screen candidates in the first stage, it only passes the candidates' CVs to the unit managers in local offices without disclosing the results from the culture-fit test. In other words, unit managers in local offices are blind to the culture-fit and credibility score once candidates pass the first stage.

Figure 2.1
Employee Selection Process

Figure 2.1 illustrates the employee selection process before and after the implementation of the culture-fit measurement system.



[24] However, human resources department has discretion to make exceptions for applicants scoring below 40 on the culture-fit score and 0 on the credibility score. These exceptions make up less than 8% of the sample. Excluding the exceptions, results remain qualitatively unchanged.

www.manaraa.com

2.3.4. Employee Performance

ABC measures employee performance on a scale of 1 to 5. The thresholds for attaining a performance rating are clearly defined, and primarily constitute objective performance targets with respect to the primary task that is assigned to the employee. Many of the objectives are measurable as they pertain to compliance and productivity standards. Yet, senior managers may also incorporate subjective assessments such as the employee's work attitude and uncontrollable factors to adjust the final performance rating. In particular, ABC maintains a two-tier system in determining the performance rating of a particular employee. The first performance rating (hereafter, objective performance rating) is provided by immediate supervisors in local offices who evaluate the target achievement rate of the employee's work. Targets are based on a combination of objective compliance and productivity measures, and thus, the objective performance rating does not incorporate managerial discretion.[25] The second performance rating (hereafter, final performance rating) is provided by senior managers in local offices who maintain the discretion to adjust the objective performance rating in light of environmental and/or relative factors. The final performance rating provides the basis for employee bonus and promotion decisions. It is important to note that the assignment of the performance ratings is less likely to be influenced by the outcome of the culture-fit test as the culture-fit scores are not disclosed to unit managers. Thus, the possibility that performance ratings are biased towards the culture-fit scores is relatively unlikely in this setting.

2.3.5. Data and Descriptive Statistics

[25] The target-setting process at ABC is relatively less subject to potential bias concerns. Local managers assign performance targets to each of the employees at their respective locations, but consider fairness as the utmost criterion in assigning individual targets to prevent the formation of a toxic culture.

www.manaraa.com

I obtained data on all newly-hired employees from all offices of ABC from 2011 to 2017. This data is at the employee-level including an employee's gender, age, and tenure; whether he or she is a manager; and whether he or she was selected through the culture-fit measurement system. In the full sample, there are 4,255 unique newly-hired employees across 217 different offices in my sample period, with an average of about 19.6 newly-hired employees in each office. Because the pre-implementation employee survey was conducted in only a subset of offices, I also form a survey sample based on these offices. I present all descriptive statistics in Table 2.1 and the correlations in Table 2.2; in each case, both for the full sample of newly-hired employees (Panel A) and for the survey sample of newly-hired employees (Panel B). A detailed description of the variable definitions is provided in Appendix D.

The descriptive statistics of the full sample in Panel A of Table 2.1 suggest that approximately 53% of all newly-hired employees were selected through the culture-fit measurement system. About 19% are female, the average age is 28, and about 7.7% are managers. The average newly-hired employee receives an annual objective performance rating of 3.19 and a final performance rating of 3.16. This suggests that senior managers' adjustments to the initial objective performance rating provided by the immediate supervisors appear to be rare.[26] The correlation table in Panel A of Table 2.2 shows that employee performance is positively correlated with age, being female, being a manager, and being selected through the culture-fit measurement system.

Descriptive statistics for the survey sample (Panel B of Tables 2.1 and 2.2) exhibit some differences relative to those of the full sample. Whereas the two samples are comparable with respect to age, role, and performance rating, the survey sample has a larger fraction of newly-hired

[26] In fact, less than 5% of the objective performance ratings were adjusted.

www.manaraa.com

employees who took the culture-fit test and who are men. Some notable differences in the correlation table are that within the survey sample, more women took the culture-fit test and that the individual performance ratings are not significantly correlated with being selected through the culture-fit measurement system.

www.manaraa.com

Table 2.1
Descriptive Statistics

Table 2.1 summarizes the characteristics of the samples of newly-hired employees. The first four rows summarize the characteristics of the sample of *unique* newly-hired employees at the individual level. The last two rows summarize the characteristics of the sample at the individual-year level. Panel A reports the descriptive statistics of the full sample. Panel B reports the descriptive statistics of the survey sample. All variables are defined in Appendix D.

Panel A: Full Sample

	N	Mean	Median	Sd	Min	Max
Treated	4255	.530	1	.499	0	1
Female	4255	.193	0	.395	0	1
Age	4255	28.304	26	6.594	18	59
Manager	4255	.077	0	.267	0	1
Final Performance Rating	12373	3.163	3	.639	1	5
Objective Performance Rating	12373	3.195	3	.643	1	5

Panel B: Survey Sample

	N	Mean	Median	Sd	Min	Max
Treated	2297	.610	1	.488	0	1
Female	2297	.117	0	.322	0	1
Age	2297	27.353	26	5.760	18	59
Manager	2297	.051	0	.220	0	1
Final Performance Rating	7027	3.117	3	.628	1	5
Objective Performance Rating	7027	3.140	3	.630	1	5

www.manaraa.com

Table 2.2
Correlation

Table 2.2 reports the correlation matrix for the variables defined in Appendix D. Panel A reports the correlation matrix of the full sample. Panel B reports the correlation matrix of the survey sample. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 level, respectively.

Panel A: Full Sample

	Treated	*Female*	*Age*	*Manager*	*Final Performance Rating*	*Objective Performance Rating*
Treated	1.0000					
Female	0.0071	1.0000				
Age	-0.2584***	0.0049	1.0000			
Manager	-0.0829***	-0.0587***	0.3037***	1.0000		
Final Performance Rating	0.0191**	0.0669***	0.0204**	0.1833***	1.0000	
Objective Performance Rating	0.0193**	0.0680***	0.0318***	0.1908***	0.9362***	1.0000

Panel B: Survey Sample

	Treated	*Female*	*Age*	*Manager*	*Final Performance Rating*	*Objective Performance Rating*
Treated	1.0000					
Female	0.0255**	1.0000				
Age	-0.2260***	-0.0017	1.0000			
Manager	-0.0969***	-0.0588***	0.3147***	1.0000		
Final Performance Rating	0.0083	0.0507***	0.0198*	0.1851***	1.0000	
Objective Performance Rating	0.0062	0.0503***	0.0352***	0.1965***	0.9466***	1.0000

www.manaraa.com

2.4. Empirical Methodology

The research site provides an attractive setting to examine the employee performance consequences of selecting employees through the culture-fit measurement system. The adoption of the culture-fit measurement system occurred in a staggered fashion, and Figure 2.2 depicts the timeline of the culture-fit measurement system implementation and number of offices that adopted the culture-fit measurement system in each year. Initially, two human resources executives were responsible for the adoption of the culture-fit measurement system. However, right before the implementation of the system, one of them left the firm unexpectedly for personal reasons; adoption in some offices was then delayed until a new human resources executive joined the firm. As a result, the actual adoption of the culture-fit measurement system occurred in different batches. This quasi-randomized feature allows me to compare employees who were selected through the culture-fit measurement system (i.e., Treated) with employees who were not selected through the culture-fit measurement system (i.e., Control) at the same point in time.[27] Specifically, I employ the following model specification to test for H1:

$$Perf_{i,t} = \alpha + \beta_1 * Treated_i + \sum_1^6 \gamma_k * Tenure\ k_{i,t} + Controls_i + Fixed\text{-}Effects + \varepsilon_{i,t} \quad (1)$$

The unit of analysis is at the employee-year level for all newly-hired employees from 2011 to 2017. The dependent variable *Perf* is either the final performance rating or the objective performance rating for the employee at the end of each year. *Treated* is the main variable of interest; it is an indicator equal to 1 for newly-hired employees who were selected after the implementation of the culture-fit measurement system—and who therefore took the culture-fit test—and 0 for new hires who were selected before the implementation and therefore did not take the culture-fit test. *Tenure*

[27] Thereby, I assume that new employees hired at control offices are sufficiently comparable to new employees hired at treatment offices except for the criteria imposed by the culture-fit measurement system adopted at the treatment offices. In Section 2.6, I perform coarsened exact matching to address the concern that the results are driven by differences in the treatment and control group; the results are unchanged.

www.manaraa.com

k is an indicator variable equal to 1 if the corresponding tenure of the employee in that year is *k* (where *k* can range from 0 to 6). In particular, *Tenure 0* is defined as the year in which the employee is hired. For example, if an employee joined the firm in 2011 and received an annual performance rating at the end of 2011, tenure would be defined as 0 in 2011 for that employee. Note that, since the culture-fit measurement system was implemented in 2012, the maximum tenure for employees selected through the culture-fit measurement system is six years (*k* can range from 0 to 5), whereas the maximum tenure for employees not selected through the culture-fit measurement system is seven years (*k* can range from 0 to 6).[28] *Tenure 0* is the base category and thus is omitted from the model. I include additional variables to control for the following observable employee characteristics: gender, age, and management position. I also include year fixed effects to control for idiosyncratic events common to all offices at the same time, as well as office fixed effects to account for time-invariant office heterogeneity. Standard errors are clustered at the employee level.[29] If newly-hired employees selected with the culture-fit measurement system perform, on average, significantly better than those selected without the system, as predicted in H1, I expect to observe a significantly positive coefficient on *Treated*.

In order to shed more light on how the performance differential evolves over the tenure cycle of the newly-hired employees, I categorize employee tenure into four tenure groups—*TenureStart*, *TenureEarly*, *TenureMid*, and *TenureLate*—and use the following model specification:

$$Perf_{i,t} = \beta_1 * Treated_i * TenureStart_{i,t} + \beta_2 * Treated_i * TenureEarly_{i,t} + \beta_3 * Treated_i * TenureMid_{i,t}$$

[28] To maintain a balanced sample between the treated group and the control group such that the maximum tenure for employees in both groups is six years, I excluded employees in the control group whose tenure is seven years from the sample and reran the analyses. Results remain qualitatively consistent.
[29] Results are robust when standard errors are clustered at the office level.

www.manaraa.com

$$+ \beta_4 * Treated_i * TenureLate_{i,t} + \beta_5 * TenureStart_{i,t} + \beta_6 * TenureEarly_{i,t} + \beta_7 * TenureMid_{i,t}$$

$$+ \beta_8 * TenureLate_{i,t} + Controls_i + Fixed\text{-}Effects + \varepsilon_{i,t} \quad (2)$$

where *TenureStart* equals 1 if the employee has been with the company less than a year (*Tenure 0*) and 0 otherwise; *TenureEarly* equals 1 if the employee has been with the company one or two years (*Tenure 1* or *Tenure 2*) and 0 otherwise; *TenureMid* equals 1 if the employee has been with the company three or four years (*Tenure 3* or *Tenure 4*) and 0 otherwise; and *TenureLate* equals 1 if the employee has been with the company more than four years (*Tenure 5* or *Tenure 6*) and 0 otherwise. All other variables are as previously defined. The variables of interest are the interaction variables between *Treated* and *Tenure* for each tenure group. These coefficients capture the performance difference between the employees selected through the culture-fit measurement system and the employees not selected through the culture-fit measurement system over tenure cycle subsequent to them getting hired (i.e., *TenureStart*, *TenureEarly*, *TenureMid* and *TenureLate*).[30]

To examine the cross-sectional differences in the performance effects as hypothesized in H2 and H3, I use two empirical specifications. First, I estimate the following model:

$$Perf_{i,t} = \alpha + \beta_1 * Treated_i * Condition + \beta_2 * Treated_i + Controls_i + Fixed\text{-}Effects + \varepsilon_{i,t} \quad (3)$$

where *Condition* refers to *ExistingSubcultureHigh* to test H2 and refers to *SharedRespHigh* to test H3. Both variables are operationalized based on the pre-implementation survey described in Section 3.2 and Appendix B. In particular, I measure *ExistingSubcultureHigh* (*SharedRespHigh*)

[30] The model was recharacterized to simplify the inference regarding the effects of treatment by tenure by incorporating all levels of tenure, including the reference level, into the model. Therefore, the model does not require an intercept term. Note that this alternative specification is numerically equivalent to a classic model with a reference level and an intercept term (up to a linear combination of the corresponding coefficients).

www.manaraa.com

based on the aggregated index of survey items 1–3 (4–15).[31, 32] *ExistingSubcultureHigh* (*SharedRespHigh*) equals 1 for office locations for which the aggregated index of answers to questions about alignment with organizational values (shared responsibility in the work environment) is above the median for all offices at which the survey was implemented, and equals 0 otherwise.[33] *Condition* is subsumed due to the inclusion of office fixed effects. A significant positive (negative) coefficient on the interaction variable suggests that *Condition* constitutes a significant moderator in generating favorable (unfavorable) performance effects of selecting employees using the culture-fit measurement system. Besides office fixed effects and year fixed effects, I also include tenure fixed effects in this model. Second, I also conduct subsample tests in which I estimate Equation (1) separately on each of the subsamples based on the partitioning variable *Condition*. If *Condition* constitutes a significant moderator for the performance consequences of newly-hired employees who were selected through the culture-fit measurement system, I expect coefficients on *Treated* to be statistically different from each other in each subsample.

To examine the cross-sectional differences in the performance effects as hypothesized in H4, I employ the following two empirical specifications. First, I estimate the following model on the sample of employees selected through the culture-fit measurement system (that is, observations for which *Treated* = 1):

[31] Survey items 1 through 3 are intended to capture the extent to which employees express alignment with the espoused organizational values. The measure *SharedRespHigh*, based on items 4 through 15, is intended to capture the construct of joint commitment and effort to provide support in the work environment so that members of the organization feel comfortable and encouraged to embrace organizational values. In particular, the measure considers employee perceptions related to support from senior leaders, supervisors, and colleagues.

[32] The aggregated index is generated using the post-factor analysis command "Predict" (in Stata), which aggregates the survey items to create an index that measures the construct.

[33] In the tabulated tests, the variables are partitioned based on the median (i.e., above median vs. below median). In untabulated tests, I partition the variables based on tertiles and compare the subsample in the top tertile with the subsample in the bottom tertile. My results remain unchanged.

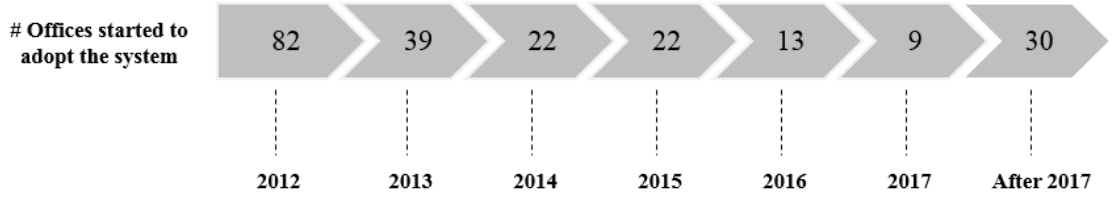
www.manaraa.com

$$Perf_{i,t} = \alpha + \beta_1 * CredibilityScore + Controls_i + Fixed\text{-}Effects + \varepsilon_{i,t} \quad (4)$$

where *CredibilityScore* refers to the credibility score that the culture-fit test generated for all employees who took the test. A positive coefficient on *CredibilityScore* would lend support for H4. Second, I also conduct subsample tests in which I estimate Equation (1) on the subsamples of employees with credibility scores above and below the median for all employees who took the culture-fit test in my sample period. Unlike the previous test (Equation (4)) that is based only on newly-hired employees who took the culture-fit test, these subsample tests are based on the full sample of newly-hired employees, and thus compare the performance between employees who took the culture-fit test (i.e., Treated) with that of employees who did not take the culture-fit test (i.e., Control). If consistent with H4, I expect to obtain a significantly positive coefficient on *Treated* in the former (i.e., above-median) but not in the latter (i.e., below-median) subsample of employees.

Figure 2.2
Timeline of the Culture-fit Measurement System Implementation

Figure 2.2 illustrates the timeline of the culture-fit measurement system implementation and number of offices that started to adopt the system in each year.



www.manaraa.com

2.5. Results

2.5.1. Test of H1: Culture-fit Measurement System and Employee Performance

Tables 2.3 and 2.4 report estimation results for Equations (1) and (2), respectively. The first (second) column presents the results for the final performance rating (objective performance rating). Results in Table 2.3 show that, for both specifications, the coefficient on *Treated* is significantly positive. These results suggest that, on average, newly-hired employees selected with the culture-fit measurement system exhibit significant better subsequent performance. In particular, interpreting the results in Column 1, employees selected with the culture-fit measurement system earn, on average, a final performance rating that is about 0.07 points higher than employees selected without the system, which is, in terms of economic magnitude, a 11% standard-deviation increase in the final performance rating.

There are several results worth noting in Table 2.4, which examines the evolution of the performance differential over the employee tenure cycle. First, for both specifications, results show that newly-hired employees exhibit increasing levels of performance the longer they work at ABC. The coefficients on each of the tenure group indicator variables (i.e., *TenureStart*, *TenureEarly*, *TenureMid*, and *TenureLate*) are positively significant and increasing, suggesting that employees exhibit performance improvements over time subsequent to their hire-year. Second, the coefficients on *Treated*×*TenureStart* and *Treated*×*TenureEarly* are not statistically significant, suggesting that, newly-hired employees selected with the culture-fit measurement system do not perform significantly better during their first few years than those who were selected without the system. Later on, though, results show evidence of significant performance differentials between these two groups of employees in subsequent years with the firm (i.e., *Treated*×*TenureMid* and

www.manaraa.com

Treated×*TenureLate*). In particular, such performance differences become increasingly larger as the employee's years at the firm accumulate. In terms of economic magnitude, performance differences between treated and control employees are 0%, 6%, 15% and 24% of a standard deviation in the final performance rating for *TenureStart*, *TenureEarly*, *TenureMid*, and *TenureLate*, respectively.

Figure 2.3 illustrates the performance effect of selecting employees through the culture-fit measurement system. Specifically, it plots the mean of the performance ratings of newly-hired employees who were selected through the culture-fit measurement system (solid line), and newly-hired employees who were not selected through the culture-fit measurement system (dashed line) in each tenure year. Figure 2.3a plots results for the final performance rating, and Figure 2.3b plots results for the objective performance rating. The graph corroborates the empirical results in Table 2.4. At the initial years of hire, performance does not exhibit significant differences between employees selected with the culture-fit measurement system and employees selected without the system. However, starting from the third year after joining the organization, the two lines diverge so that newly-hired employees selected with the culture-fit measurement system start to perform significantly better than those selected without the system. Collectively, these performance patterns provide support for my prediction in H1.[34]

[34] In untabulated tests, I partition the offices into early adopters and late adopters based on the implementation year. The results show that the performance consequences of adopting the system do not exhibit significant differences between early adopters and late adopters, suggesting that the effectiveness of the system is relatively consistent over time.

www.manaraa.com

Figure 2.3
Mean Performance over Time: Treated vs. Control

Figure 2.3a plots the mean of the final performance rating of newly-hired employees selected through the culture-fit measurement system (in solid), and newly-hired employees not selected through the culture-fit measurement system (in dashes) at each tenure year. Figure 2.3b plots the mean of the objective performance rating of newly-hired employees selected through the culture-fit measurement system (in solid), and newly-hired employees not selected through the culture-fit measurement system (in dashes) at each tenure year.

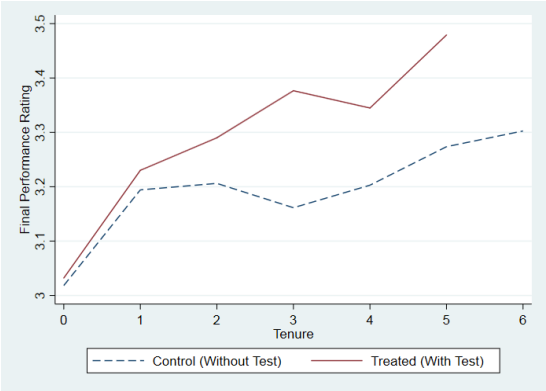


Figure 2.3a: Final Performance Rating

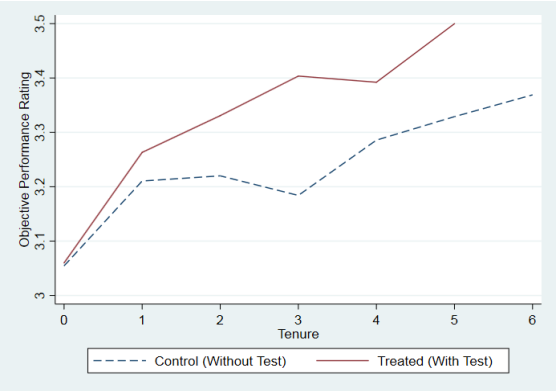


Figure 2.3b: Objective Performance Rating

www.manaraa.com

Table 2.3
Effect of Adopting the Culture-fit Measurement System: Overall Performance Effect

Table 2.3 reports results of tests examining the overall effect of the culture-fit measurement system implementation in the employee selection process on the employee's subsequent performance. Dependent variable of Column (1) is *Final Performance Rating*. Dependent variable of Column (2) is *Objective Performance Rating*. Table 2.3 is based on the full sample. All variables are defined in Appendix D. T-statistics, reported in parentheses, are based on standard errors clustered at the employee level. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 level, respectively.

	(1)	(2)
	Final Performance Rating	***Objective Performance Rating***
Treated	0.068***	0.053**
	(2.61)	(2.06)
(Baseline omitted group: Tenure 0)		
Tenure 1	0.185***	0.167***
	(11.57)	(10.44)
Tenure 2	0.244***	0.218***
	(10.56)	(9.55)
Tenure 3	0.265***	0.227***
	(8.79)	(7.60)
Tenure 4	0.246***	0.227***
	(6.15)	(5.75)
Tenure 5	0.282***	0.248***
	(5.64)	(4.94)
Tenure 6	0.288***	0.267***
	(4.44)	(4.18)
Female	0.082***	0.077***
	(4.14)	(3.91)
Age	-0.006***	-0.005***
	(-4.52)	(-3.92)
Manager	0.353***	0.358***
	(12.00)	(12.51)
Constant	3.039***	3.300***
	(68.89)	(75.36)
N	12373	12373
Adjusted R-squared	0.128	0.143
Year Fixed Effects	Yes	Yes
Office Fixed Effects	Yes	Yes

www.manaraa.com

Table 2.4
Effect of Adopting the Culture-fit Measurement System: Performance Effect over Time

Table 2.4 reports results of tests examining the effect of the culture-fit measurement system implementation in the employee selection process on the employee's subsequent performance over time. Dependent variable of Column (1) is *Final Performance Rating*. Dependent variable of Column (2) is *Objective Performance Rating*. *TenureStart* is 1 if the employee has been with the company less than a year (i.e., *Tenure 0*), and 0 otherwise. *TenureEarly* is 1 if the employee has been with the company one or two years (i.e., *Tenure 1* or *Tenure 2*), and 0 otherwise. *TenureMid* is 1 if the employee has been with the company three or four years (i.e., *Tenure 3* or *Tenure 4*), and 0 otherwise. *TenureLate* is 1 if the employee has been with the company more than four years (i.e., *Tenure 5* or *Tenure 6*), and 0 otherwise. Note that the model was recharacterized to simplify the inference regarding the effects of treatment by tenure by incorporating all levels of tenure, including the reference level, into the model. Therefore, the model does not require an intercept term. Table 2.4 is based on the full sample. All other variables are defined in Appendix D. T-statistics, reported in parentheses, are based on standard errors clustered at the employee level. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 level, respectively.

	(1) ***Final Performance Rating***	(2) ***Objective Performance Rating***
Treated×TenureStart	0.001	-0.018
	(0.03)	(-0.59)
Treated×TenureEarly	0.039	0.038
	(1.44)	(1.37)
Treated×TenureMid	0.098***	0.068*
	(2.68)	(1.89)
Treated×TenureLate	0.155**	0.110
	(2.29)	(1.57)
TenureStart	2.998***	3.264***
	(69.68)	(75.99)
TenureEarly	3.168***	3.404***
	(58.43)	(62.44)
TenureMid	3.181***	3.420***
	(47.87)	(51.12)
TenureLate	3.200***	3.437***
	(40.44)	(43.10)
Female	0.084***	0.079***
	(4.23)	(4.00)
Age	-0.006***	-0.005***
	(-4.43)	(-3.83)
Manager	0.356***	0.361***
	(12.11)	(12.61)
N	12373	12373
Adjusted R-squared	0.966	0.967
Year Fixed Effects	Yes	Yes
Office Fixed Effects	Yes	Yes

www.manaraa.com

2.5.2. Test of H2: Clash with Existing Subculture

Table 2.5 reports results from the cross-sectional tests in which the partitioning variable is *ExistingSubcultureHigh*—the extent to which existing employees identify with organizational values. Columns 1–3 (4–6) present the results relative to the final performance rating (objective performance rating). Columns 1 and 4 provide the results from estimating Equation (3); the coefficient on the interaction variable between *Treated* and *ExistingSubcultureHigh* is significantly positive. This suggests that newly-hired employees selected with the culture-fit measurement system perform significantly better in an existing subculture that more strongly embraces organizational values. Columns 2 and 5 (3 and 6) present the results of estimating Equation (1) on the subsample of observations for which *ExistingSubcultureHigh* equals 1 (0). Whereas the coefficient on *Treated* in the subsample for which *ExistingSubcultureHigh* equals 1 is significantly positive (Columns 2 and 5), the coefficient on *Treated* in the subsample for which *ExistingSubcultureHigh* equals 0 is significantly negative (Columns 3 and 6).[35] The economic magnitudes suggest that in offices where the existing subculture is more aligned with espoused organizational values, employees selected with the culture-fit measurement system perform 22.6% of a standard deviation better in the final performance rating than employees selected without the system, while in offices where the existing subculture is less aligned with the espoused values, employees selected with the system perform 17.8% of a standard deviation worse in the final performance rating than employees selected without the system. These results suggest that employees selected through the culture-fit measurement system are only able to thrive in a subculture that is consistent with organizational values. Yet, if employees selected through the

[35] The difference in coefficients between "above median" (Columns 2 and 5) and "below median" (Columns 3 and 6) is statistically significant at the 1% level.

www.manaraa.com

culture-fit measurement system are placed in offices with established subculture that is poorly aligned with organizational values, their performance rather deteriorates.

Overall, the results suggest that *ExistingSubcultureHigh* constitutes a significant moderator of the performance effects of selecting employees through a formal culture-fit measurement system. More importantly, these findings provide evidence that the extent to which existing employees identify with organizational values is an important factor that can determine the success from implementing a formal culture-fit measurement system in the employee selection process—potentially also resulting in adverse performance consequences. These results are consistent with H2 and provide empirical support for the "culture clash" articulated in Van den Steen (2010).[36]

[36] Figure 2.4 provides a graphical illustration for the results in Table 2.5 by plotting the mean of the performance ratings of newly-hired employees who were selected through the culture-fit measurement system and who joined an office in which the existing employees' alignment with organizational values is above median (in solid), newly-hired employees who were selected through the culture-fit measurement system and who joined an office in which the existing employees' alignment with organizational values is below median (in dots), and newly-hired employees who were not selected through the culture-fit measurement system (in dashes) at each tenure year.

www.manaraa.com

Figure 2.4
Mean Performance over Time: Treated (High Existing Subculture) vs. Treated (Low Existing Subculture) vs. Control

Figure 2.4a (b) plots the mean of the final performance rating (objective performance rating) of 1) newly-hired employees who were selected through the culture-fit measurement system and who joined an office in which the existing employees' alignment with organizational values is above median (in solid), 2) newly-hired employees who were selected through the culture-fit measurement system and who joined an office in which the existing employees' alignment with organizational values is below median (in dots), and 3) newly-hired employees who were not selected through the culture-fit measurement system (in dashes) at each tenure year.

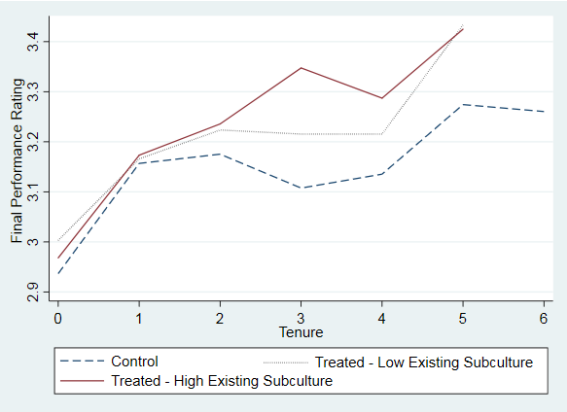


Figure 2.4a: Final Performance Rating

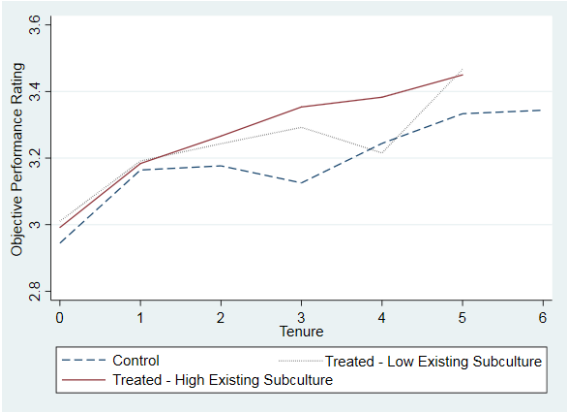


Figure 2.4b: Objective Performance Rating

www.manaraa.com

Table 2.5
Cross-sectional Analysis on Existing Subculture

Table 2.5 reports results of cross-sectional tests on existing subculture, measured by the aggregated index of pre-implementation survey responses to questions about alignment with organizational values within each office (survey items 1–3). *ExistingSubcultureHigh* is 1 for office locations for which the aggregated index of answers to questions about alignment with organizational values is above the median for all offices at which the survey was implemented, and 0 otherwise. Dependent variable of Columns (1)–(3) is *Final Performance Rating*. Dependent variable of Columns (4)–(6) is *Objective Performance Rating*. Columns 2 and 5 (3 and 6) present the results of estimating Equation (1) on the subsample of observations for which *ExistingSubcultureHigh* is 1 (0). Table 2.5 is based on the survey sample. All other variables are defined in Appendix D. T-statistics, reported in parentheses, are based on standard errors clustered at the employee level. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Final Performance Rating			***Objective Performance Rating***		
	All Sample	***Subsample (Above Median)***	***Subsample (Below Median)***	***All Sample***	***Subsample (Above Median)***	***Subsample (Below Median)***
Treated×ExistingSubcultureHigh	0.135***			0.130***		
	(3.46)			(3.43)		
Treated	-0.055	0.142***	-0.112**	-0.057	0.135***	-0.115**
	(-1.41)	(3.05)	(-2.32)	(-1.49)	(2.99)	(-2.38)
Female	0.088***	0.099**	0.080*	0.081***	0.103**	0.063
	(2.94)	(2.27)	(1.93)	(2.75)	(2.42)	(1.51)
Age	-0.006***	-0.003	-0.008***	-0.005***	-0.003	-0.007***
	(-3.09)	(-1.16)	(-3.30)	(-2.75)	(-1.00)	(-2.90)
Manager	0.431***	0.464***	0.394***	0.437***	0.491***	0.379***
	(10.47)	(7.18)	(7.77)	(10.94)	(7.89)	(7.80)
Constant	3.146***	2.986***	3.152***	3.078***	2.981***	3.065***
	(41.07)	(31.37)	(34.26)	(40.78)	(31.80)	(33.27)
N	7027	3391	3636	7027	3391	3636
Adjusted R-squared	0.115	0.121	0.105	0.131	0.135	0.125
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Office Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Tenure Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

www.manaraa.com

2.5.3. Test of H3: Importance of Shared Responsibility

Table 2.6 reports the results of cross-sectional tests in which the partitioning variable is *SharedRespHigh*—the extent to which the surrounding work environment of the employee exhibits a sense of shared responsibility to embrace organizational values. The structure of the reported results is similar to that in Table 2.5. Columns 1 and 4 show that the coefficient on the interaction variable between *Treated* and *SharedRespHigh* is significantly positive. This result suggests that newly-hired employees with the culture-fit test tend to perform better in offices with relatively greater levels of shared responsibility in the work environment to strive for organizational values. Turning to the results of the subsample tests, the table reports a significantly positive coefficient on *Treated* in the subsample for which *SharedRespHigh* equals 1 (Columns 2 and 5). However, the same coefficient is insignificantly negative in the subsample for which *SharedRespHigh* equals 0 (Columns 3 and 6).[37] The economic magnitude shows that in a work environment that exhibits greater levels of shared responsibility to embrace organizational values, employees selected with the culture-fit measurement system perform 15.9% of a standard deviation better in the final performance rating than employees selected without the system. Collectively, these results suggest that newly-hired employees selected with the culture-fit measurement system are only able to thrive with sufficient organization-level support where employees share a collective sense of responsibility.[38]

Overall, the results suggest that *SharedRespHigh* constitutes a significant moderator for the relation between selecting employees through the culture-fit measurement system and

[37] The difference in coefficients between "above median" (Columns 2 and 5) and "below median" (Columns 3 and 6) is statistically significant at the 10% level.

[38] In untabulated tests, I distinguish among "senior leaders," "supervisors," and "colleagues." In particular, I use an aggregated index of survey items 4–7 to proxy for support from senior leaders, items 8–11 to proxy for support from supervisors, and items 12–15 to proxy for support from colleagues. The results do not exhibit significant differences across these three types of support.

www.manaraa.com

subsequent employee performance. The empirical evidence in Table 2.6 is consistent with H3, and provides evidence that the degree of shared responsibility in embracing organizational values is an important factor that can determine the success from implementing a formal culture-fit measurement system in the employee selection process.[39]

Figure 2.5
Mean Performance over Time: Treated (High Shared Responsibility) vs. Treated (Low Shared Responsibility) vs. Control

Figure 2.5a (b) plots the mean of the final performance rating (objective performance rating) of 1) newly-hired employees who were selected through the culture-fit measurement system and who joined an office in which the level of shared responsibility is above median (in solid), 2) newly-hired employees who were selected through the culture-fit measurement system and who joined an office in which the level of shared responsibility is below median (in dots), and 3) newly-hired employees who were not selected through the culture-fit measurement system (in dashes) at each tenure year.

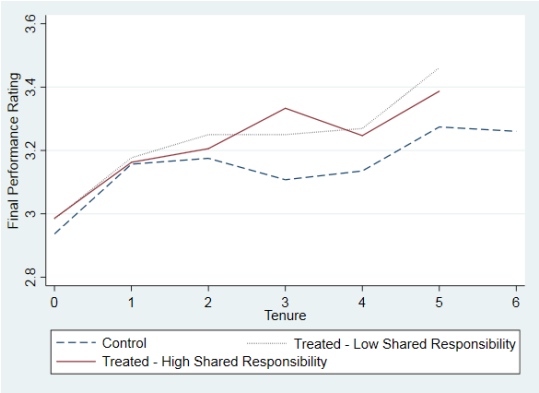


Figure 2.5a: Final Performance Rating

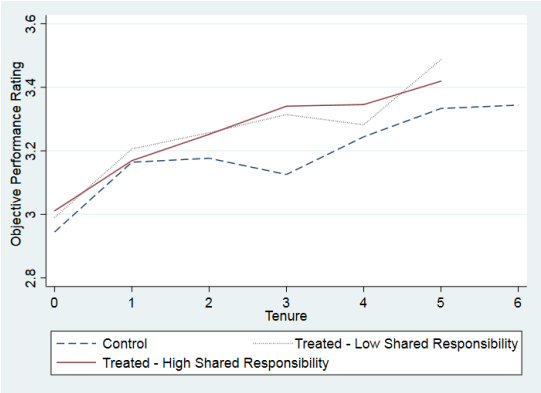


Figure 2.5b: Objective Performance Rating

[39] Figure 2.5 provides a graphical illustration for the results in Table 2.6 by plotting the mean of the performance ratings of newly-hired employees who were selected through the culture-fit measurement system and who joined an office in which the level of shared responsibility is above median (in solid), newly-hired employees who were selected through the culture-fit measurement system and who joined an office in which the level of shared responsibility is below median (in dots), and newly-hired employees who were not selected through the culture-fit measurement system (in dashes) at each tenure year.

www.manaraa.com

Table 2.6
Cross-sectional Analysis on Shared Responsibility

Table 2.6 reports results of cross-sectional tests on shared responsibility, measured by the aggregated index of pre-implementation survey responses to questions about shared responsibility in the work environment within each office (survey items 4–15). *SharedRespHigh* is 1 for office locations for which the aggregated index of answers to questions about shared responsibility is above the median for all offices at which the survey was implemented, and 0 otherwise. Dependent variable of Columns (1)–(3) is *Final Performance Rating*. Dependent variable of Columns (4)–(6) is *Objective Performance Rating*. Columns 2 and 5 (3 and 6) present the results of estimating Equation (1) on the subsample of observations for which *SharedRespHigh* is 1 (0). Table 2.6 is based on the survey sample. All other variables are defined in Appendix D. T-statistics, reported in parentheses, are based on standard errors clustered at the employee level. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Final Performance Rating			***Objective Performance Rating***		
	All Sample	***Subsample (Above Median)***	***Subsample (Below Median)***	***All Sample***	***Subsample (Above Median)***	***Subsample (Below Median)***
Treated×SharedRespHigh	0.109***			0.109***		
	(2.77)			(2.86)		
Treated	-0.043	0.100**	-0.071	-0.048	0.093**	-0.074
	(-1.08)	(2.11)	(-1.50)	(-1.23)	(2.05)	(-1.55)
Female	0.087***	0.157***	0.026	0.081***	0.162***	0.008
	(2.89)	(3.41)	(0.66)	(2.70)	(3.65)	(0.21)
Age	-0.006***	-0.003	-0.009***	-0.005***	-0.002	-0.008***
	(-3.04)	(-1.03)	(-3.34)	(-2.70)	(-0.78)	(-3.04)
Manager	0.431***	0.450***	0.401***	0.437***	0.469***	0.392***
	(10.46)	(7.11)	(7.82)	(10.94)	(7.62)	(7.90)
Constant	3.130***	3.020***	3.152***	3.065***	3.000***	3.080***
	(40.96)	(30.85)	(32.75)	(40.64)	(31.59)	(32.07)
N	7027	3495	3532	7027	3495	3532
Adjusted R-squared	0.114	0.112	0.115	0.130	0.128	0.135
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Office Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Tenure Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

www.manaraa.com

2.5.4. Test of H4: Noise in Culture-fit Measurement due to Potential Gaming Behavior

Table 2.7 reports the results of the tests that examine the extent of potential gaming behaviors. In particular, Columns 1 and 4 present the results of estimating Equation (4) with the final performance rating and the objective performance rating, respectively, as the dependent variable. The main variable of interest is *CredibilityScore*, which quantifies the extent to which employees intend to hide their true type in the culture-fit test.[40] The result shows that the coefficient on *CredibilityScore* is positive but not significant, implying that among newly-hired employees who were selected through the culture-fit system, the credibility score is not associated with an incremental effect in explaining subsequent performance. However, the results of the subsample tests in Columns 2 and 3 (Columns 5 and 6), where the dependent variable is the final performance rating (objective performance rating), provide some evidence that the credibility score constitutes a significant factor in understanding the performance differential between newly-hired employees that were selected with and without the culture-fit test. Specifically, the coefficient on *Treated* is significantly positive for the subsample with a credibility score above the median for all employees who took the culture-fit test (Columns 2 and 5), but not significant for the subsample with a below-median credibility score (Columns 3 and 6). The results from these subsample tests imply that the favorable performance effects are primarily driven by the newly-hired employees with relatively higher credibility scores, and that newly-hired employees with relatively lower credibility scores do not exhibit significant performance differentials with newly-hired employees that were selected without the culture-fit system. In terms of economic magnitude,

[40] My tests only allow for the most conservative method of estimating the effects as I only have data available on newly-hired employees who took the test. Applicants who took the test but were not hired due to low credibility scores are not included in my sample, and thus, the estimated effects are potentially understated. In other words, my tests give me a lower bound on the effects of noise in measurement of culture fit.

www.manaraa.com

treated employees who have higher credibility score perform 15.3% of a standard deviation better in the final performance rating than control employees.

Collectively, these results seem to imply that for the culture-fit measurement system to generate positive performance consequences, employees need to meet a minimum threshold in terms of the credibility score. In other words, whereas some gaming effort to score higher on the culture-fit test is not predictive of adverse performance consequences, extreme gaming behaviors that limit the interpretation of the employees' culture-fit score can provide meaningful signals of their subsequent performance potential. These findings are largely consistent with H4, and suggest that employees selected with the culture-fit measurement system perform significantly better than those selected without the system only when their answers are highly credible.[41]

[41] Figure 2.6 provides a graphical illustration for the results in Table 2.7 by plotting the mean of the performance ratings of newly-hired employees who were selected through the culture-fit measurement system and whose answers' credibility score is above median (in solid), newly-hired employees who were selected through the culture-fit measurement system and whose answers' credibility score is below median (in dots), and newly-hired employees who were not selected through the culture-fit measurement system (in dashes) at each tenure year. One interesting observation from Figure 2.6 is that although treated employees who have higher credibility scores perform better than treated employees who have lower credibility scores, treated employees who have lower credibility score still exhibit greater performance improvements over time than employees in the control group (i.e., those who were not selected through the culture-fit measurement system). This observation suggests that the implementation of a culture-fit measurement system is associated with positive performance consequences even for employees identified as potential "gamers". One possible explanation is that, whereas such employees are not intrinsically motivated to exert better performance, the implementation of a culture-fit measurement system in the employee selection process allowed for the increase in clarity of organizational values—or, the extent to which they understand the organizational values to induce positive learning effects (i.e., their personal values are shaped by the organizational values after they join the firm).

www.manaraa.com

Figure 2.6
Mean Performance over Time: Treated (High Credible) vs. Treated (Low Credible) vs. Control

Figure 2.6a (b) plots the mean of the final performance rating (objective performance rating) of 1) newly-hired employees who were selected through the culture-fit measurement system and whose credibility scores are above median (in solid), 2) newly-hired employees who were selected through the culture-fit measurement system and whose credibility scores are below median (in dots), and 3) newly-hired employees who were not selected through the culture-fit measurement system (in dashes).

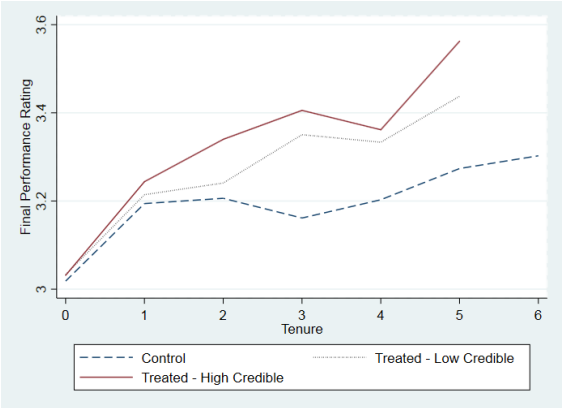


Figure 2.6a: Final Performance Rating

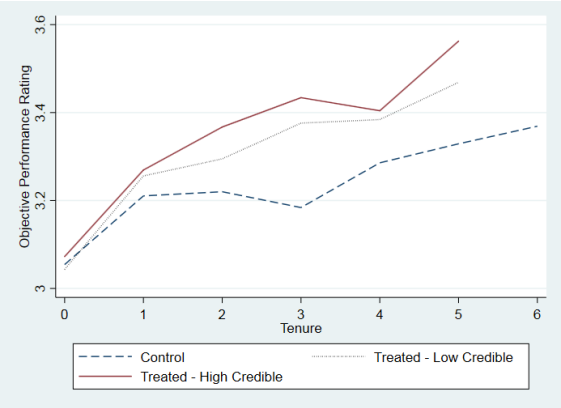


Figure 2.6b: Objective Performance Rating

www.manaraa.com

Table 2.7
Cross-sectional Analysis on Credibility Score

Table 2.7 reports results of cross-sectional tests on the credibility of the answers to the culture-fit test. *CredibilityScore*, a continuous variable, is the credibility score generated by the culture-fit test. Dependent variable of Columns (1)–(3) is *Final Performance Rating*. Dependent variable of Columns (4)–(6) is *Objective Performance Rating*. In Columns (1) and (4), only employees selected through the culture-fit measurement system are included in the sample. In Columns (2) and (5), treated employees with credibility scores above median and control employees are included in the sample. In Columns (3) and (6), treated employees with credibility scores below median and control employees are included in the sample. Table 2.7 is based on the full sample. All other variables are defined in Appendix D. T-statistics, reported in parentheses, are based on standard errors clustered at the employee level. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Final Performance Rating			***Objective Performance Rating***		
	Treated Only	***High Credibility Score***	***Low Credibility Score***	***Treated Only***	***High Credibility Score***	***Low Credibility Score***
CredibilityScore	0.007			0.004		
	(1.11)			(0.57)		
Treated		0.098***	0.050		0.073**	0.043
		(3.01)	(1.56)		(2.26)	(1.37)
Female	0.100***	0.075***	0.078***	0.083***	0.074***	0.074***
	(3.45)	(3.26)	(3.38)	(2.92)	(3.26)	(3.24)
Age	-0.001	-0.006***	-0.006***	-0.001	-0.005***	-0.005***
	(-0.27)	(-4.66)	(-4.52)	(-0.29)	(-4.00)	(-3.88)
Manager	0.300***	0.358***	0.357***	0.299***	0.363***	0.365***
	(6.15)	(10.65)	(11.12)	(6.65)	(11.00)	(11.53)
Constant	3.032***	3.070***	3.043***	2.980***	3.322***	3.311***
	(31.31)	(63.39)	(60.74)	(31.05)	(68.91)	(66.12)
N	5276	9888	9582	5276	9888	9582
Adjusted R-squared	0.129	0.133	0.132	0.146	0.145	0.147
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Office Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Tenure Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

www.manaraa.com

2.6. Additional Tests

2.6.1. Informativeness of Culture-fit Scores

If the culture-fit test is effective in selecting better fitting employees by ABC, not only the implementation of the culture-fit measurement system, but also the culture-fit test scores should contain informative content about the extent of the employee's culture-fit. Empirically, I would expect the performance differential to be increasing in the culture-fit score. To test this prediction, I conduct empirical tests similar to those for H4 in which I replace the variable *CredibilityScore* with the actual culture-fit score *FitScore*. In particular, *FitScore* is a continuous variable that refers to the culture-fit score resulting from the culture-fit test. The results are reported in Table 2.8; the structure of the tabulated results is similar to that of Table 2.7.

The results provide corroborating evidence that the culture-fit test produces measures that entail information regarding the extent of alignment with organizational values. In particular, the coefficient on the variable *FitScore* is significantly positive in Columns 1 and 4. This suggests that among newly-hired employees that were selected through the culture-fit system, the value of the culture-fit score is incrementally informative in explaining subsequent performance. The economic magnitude suggests that a shift of culture-fit score from the 25th percentile to the 75th percentile increases 6.8% of a standard-deviation in final performance rating. Moreover, the subsample tests corroborate the informativeness of the culture-fit score by demonstrating that the favorable performance effects are primarily driven by the newly-hired employees with relatively higher culture-fit scores. The results show that the coefficient on *Treated* is significantly positive for the subsample of employees with a culture-fit score above the median for all employees who took the culture-fit test (Columns 2 and 5), but insignificant for the subsample with a culture-fit score below the median (Columns 3 and 6). In terms of economic magnitude, treated employees who have

www.manaraa.com

higher culture-fit score perform 21.3% of a standard deviation better in final performance rating than control employees. Collectively, these findings suggest that the best-performing employees are those with relatively higher culture-fit scores. The results also suggest that employees selected through the culture-fit measurement system, but with relatively lower culture-fit scores do not exhibit adverse performance after being selected into the organization.[42]

Figure 2.7
Mean Performance over Time: Treated (High Fit Score) vs. Treated (Low Fit Score) vs. Control

Figure 2.7a (b) plots the mean of the final performance rating (objective performance rating) of 1) newly-hired employees who were selected through the culture-fit measurement system with fit scores above median (in solid), 2) newly-hired employees who were selected through the culture-fit measurement system with fit scores below median (in dots), and 3) newly-hired employees who were not selected through the culture-fit measurement system (in dashes) at each tenure year.

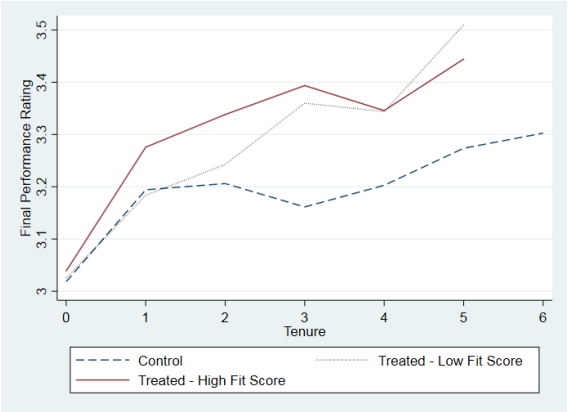


Figure 2.7a: Final Performance Rating

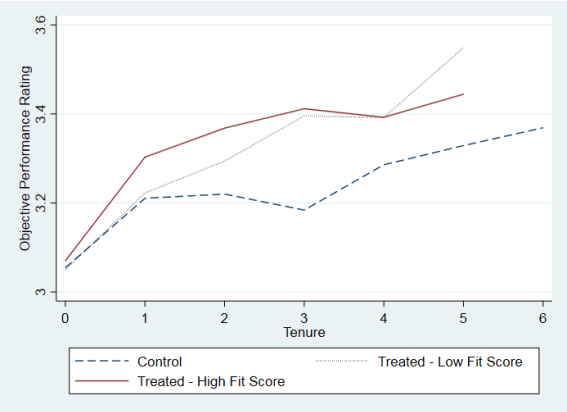


Figure 2.7b: Objective Performance Rating

[42] Figure 2.7 provides a graphical illustration of the results in Table 2.8 by plotting the mean of the performance ratings of newly-hired employees who were selected through the culture-fit measurement system with fit scores above median (in solid), newly-hired employees who were selected through the culture-fit measurement system with fit scores below median (in dots), and newly-hired employees who were not selected through the culture-fit measurement system (in dashes) at each tenure year.

www.manaraa.com

Table 2.8
Additional Test: Analysis on Culture-fit Score

Table 2.8 reports results of cross-sectional tests on culture-fit scores. *FitScore*, a continuous variable, is the culture-fit score generated by the culture-fit test. Dependent variable of Columns (1)–(3) is *Final Performance Rating*. Dependent variable of Columns (4)–(6) is *Objective Performance Rating*. In Columns (1) and (4), only employees selected through the culture-fit measurement system are included in the sample. In Columns (2) and (5), treated employees with fit scores above median and control employees are included in the sample. In Columns (3) and (6), treated employees with fit scores below median and control employees are included in the sample. Table 2.8 is based on the full sample. All other variables are defined in Appendix D. T-statistics, reported in parentheses, are based on standard errors clustered at the employee level. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Final Performance Rating			***Objective Performance Rating***		
	Treated Only	***High Fit Score***	***Low Fit Score***	***Treated Only***	***High Fit Score***	***Low Fit Score***
FitScore	0.166***			0.150***		
	(3.16)			(2.91)		
Treated		0.136***	0.005		0.112***	0.000
		(4.10)	(0.17)		(3.42)	(0.00)
Female	0.099***	0.080***	0.072***	0.082***	0.079***	0.068***
	(3.43)	(3.50)	(3.11)	(2.91)	(3.53)	(2.96)
Age	-0.001	-0.006***	-0.006***	-0.001	-0.005***	-0.005***
	(-0.46)	(-4.71)	(-4.64)	(-0.45)	(-4.05)	(-3.97)
Manager	0.301***	0.353***	0.364***	0.301***	0.366***	0.364***
	(6.14)	(10.57)	(11.16)	(6.66)	(11.25)	(11.28)
Constant	2.956***	3.092***	3.018***	2.904***	3.348***	3.282***
	(30.13)	(64.02)	(60.61)	(29.88)	(69.31)	(66.27)
N	5276	9735	9735	5276	9735	9735
Adjusted R-squared	0.131	0.138	0.132	0.148	0.151	0.145
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Office Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Tenure Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

www.manaraa.com

2.6.2. Effect on Promotion and Termination Outcomes

Prior research documents the prevalence of promotion-based incentives within organizations (e.g., Campbell 2008). Since promotions are associated with higher status, more decision rights, and increases in pay, organizations expend a considerable amount of effort in selecting the "right" employees to be promoted to the next position. Various factors may be considered such as past performance or forward-looking expectations about the employee's fit with the particular position or role (Deller 2017). If employees selected through the culture-fit measurement system are more likely to exhibit desirable behaviors that are aligned with organizational values, such employees should also exhibit a higher propensity to be promoted. I formally test this prediction and report the results in Columns 1 and 2 of Table 2.9. In particular, I estimate logit regressions in which the dependent variable is an indicator variable equal to 1 if the employee was promoted in the subsequent year and 0 otherwise. Moreover, in addition to the control variables for employee characteristics, Column 2 also includes the employee's final performance rating as an additional control. The results show that *Final Performance Rating* is positively correlated with the likelihood of being promoted, suggesting that past performance is a strong indicator for promotion at the organization. The results show that the coefficient on *Treated* is significantly positive even after controlling for *Final Performance Rating*, with the odds of being promoted for employees selected with the culture-fit measurement system being 1.35 times those for employees selected without the system.[43, 44]

Employees may leave either voluntarily, due to low satisfaction with the organization, or involuntarily—that is, laid off due to low performance. In Columns 3 and 4 of Table 2.9, I examine

[43] Results are robust when *Final Performance Rating* is replaced with *Objective Performance Rating*.
[44] The coefficients in Table 2.9 are given in units of log odds. To interpret the coefficients, I transform the log odds to odds: $e^{(0.301)}=1.35$.

www.manaraa.com

whether employees selected through the culture-fit measurement system are associated with a different likelihood of leaving the organization. In particular, I estimate logit regressions in which the dependent variable *Termination* is an indicator variable equal to 1 if the employee left the organization in the subsequent year and 0 otherwise.[45] The results in Column 4 show that *Final Performance Rating* is negatively associated with *Termination*, suggesting that past performance is a strong indicator for employee departure decisions. However, in both model specifications, *Treated* is not significantly associated with employee turnover, as it was with promotion. Collectively, these results suggest that past performance constitutes a primary factor in influencing employee promotion and turnover decisions, but that the extent of culture-fit alignment exhibits incremental explanatory power only for promotion decisions and not for turnover decisions.

[45] In untabulated tests, I distinguish voluntary and involuntary instances. The results do not exhibit differences across these two types of employee turnover outcomes.

www.manaraa.com

Table 2.9
Additional Test: Promotion and Termination Effect of Adopting the Culture-fit Measurement System

Table 2.9 reports results of tests examining the effect of the culture-fit measurement system implementation in the employee selection process on the employee's promotion and termination outcome in the subsequent year. Dependent variable of Column (1) and Column (2) is $Promotion_{(t+1)}$, which is an indicator variable equal to 1 if the employee was promoted in the subsequent year, and 0 otherwise. Dependent variable of Column (3) and Column (4) is $Termination_{(t+1)}$, which is an indicator variable equal to 1 if the employee left the organization in the subsequent year, and 0 otherwise. Column (2) and Column (4) include *Final Performance Rating* as an additional control variable. Table 2.9 is based on the full sample. All other variables are defined in Appendix D. T-statistics, reported in parentheses, are based on standard errors clustered at the employee level. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 level, respectively.

	(1)	(2)	(3)	(4)
	***Promotion*$_{(t+1)}$**		***Termination*$_{(t+1)}$**	
Treated	0.322**	0.301**	0.097	0.153
	(2.40)	(2.28)	(1.04)	(1.62)
Final Performance Rating		0.250***		-0.730***
		(4.08)		(-17.24)
Female	-0.228**	-0.250**	-0.221***	-0.160**
	(-2.34)	(-2.57)	(-3.25)	(-2.34)
Age	-0.028***	-0.026***	-0.012***	-0.016***
	(-4.59)	(-4.26)	(-2.77)	(-3.74)
Manager	1.093***	1.007***	-1.460***	-1.223***
	(7.12)	(6.62)	(-10.57)	(-8.64)
Constant	-27.799***	-27.854***	-4.371***	-2.215***
	(-31.51)	(-22.53)	(-16.06)	(-7.43)
N	11258	11258	12294	12294
Pseudo R-squared	0.556	0.558	0.239	0.262
Year Fixed Effects	Yes	Yes	Yes	Yes
Office Fixed Effects	Yes	Yes	Yes	Yes
Tenure Fixed Effects	Yes	Yes	Yes	Yes

www.manaraa.com

2.6.3. Robustness Tests

In this section, I conduct additional robustness tests to address potential concerns that the empirical results may be biased due to (1) inadequate matching between treated and control employees and/or (2) time- and location-specific confounding factors coinciding with the implementation of the culture-fit system. To address the former, I conduct two additional tests. First, I perform coarsened exact matching between the treated and control employees based on gender, age, and management position and conduct my empirical analyses using the balanced sample.[46] The results (untabulated) are consistent with those of the main tests. Second, to further investigate the robustness of the quasi-randomization between the treated and control employees, I conduct a covariate balance analysis in each year to ease the concern that offices at which the culture-fit system was implemented are significantly different from those at which it had not yet been implemented. In particular, I compare the office-level survey results on existing subculture and shared responsibility across offices in each adoption year (that is, separately for 2012, 2013, 2014, 2015, 2016, and 2017) and find no statistically significant differences.[47]

To address the latter concern, I examine the possibility that the documented empirical effects may not be due to the newly implemented culture-fit system, but due to other exogenous macroeconomic factors that coincide with the staggered implementation of the culture-fit system in each of the geographic locations. However, this possibility is highly unlikely: as for the findings to be spurious or to reflect other shocks, a significantly large geographic area within China would have to have been exposed to similar local economic conditions. Moreover, the managers at each

[46] This approach assumes that after reweighting the data to account for the distribution of observed exogenous variables, the endogenous treatment variable (i.e., selected through culture-fit measurement system) is as good as randomly assigned. Untabulated results show that, after matching, the means of the exogenous covariates are statistically significantly balanced.

[47] Unfortunately, I do not have other office-level data such as office-level revenue or profit.

www.manaraa.com

of the locations would have had to alter their managerial practices that coincided with the location-specific economic conditions in advance. Nonetheless, to address this potential concern, I conduct a placebo analysis in which I randomly assign the implementation year of the culture-fit measurement system to each office. Using 100 replications, the average placebo effect is not distinguishable from zero, suggesting that there is no significant performance effect when the timing of the implementation is randomly assigned.

2.7. Conclusion

Many organizations use formal management control systems to manage or shape organizational culture. However, the effectiveness of such formal management control systems is understudied. This study contributes by examining the employee performance effects of adopting a formal culture-fit measurement system in the employee hiring process aimed to systematically select employees who are aligned with organizational values. Using proprietary data from a highly decentralized company, I document whether the adoption of a culture-fit measurement system is able to select better-performing employees and, more importantly, under what conditions this system is more or less effective.

My findings show that employees selected with the culture-fit measurement system perform significantly better than employees selected without the system. In particular, there is no performance differential in their initial years with the organization, but employees selected through the culture-fit measurement system systematically exhibit greater performance in subsequent years. Moreover, I show that the effectiveness of adopting a culture-fit measurement system exhibits cross-sectional variation depending on (1) the interaction with the existing subculture, (2) the

www.manaraa.com

extent of shared responsibility amongst employees in the work environment, and (3) the noise in the measurement of culture-fit due to the gaming behavior of the applicants.

This study is subject to several limitations. Despite the advantages of the field setting to examine the performance consequences of adopting a formal culture-fit measurement system, as my findings are based on archival data from a single company, they may not generalize to other settings. My findings are most likely to generalize to settings in which organizational values and culture are an integral part of the organization. Another limitation is that due to the implicit nature of culture, the formal measurement system may capture alternative traits of employees in addition to culture fit. Yet, the findings related to the evolution of the performance differential between employees selected with the culture-fit measurement system and those selected without the system as well as the findings of several cross-sectional analyses suggest that my results cannot be explained purely by differences in other traits but rather in culture fit. Finally, I would like to note that the conditions I examine for the effectiveness of the implementation of a culture-fit measurement system are not exhaustive, and I encourage further research to explore additional organization-level factors such as differences in firms' business environment and strategic orientation.

Despite its limitations, this study highlights that adopting a culture-fit measurement system in the employee selection process per se is not a panacea to shape organizational culture. Instead, the effectiveness of such a system critically hinges on the existing subculture, the employee's immediate work environment, and the room for candidates to game the system. This study provides important managerial implications with respect to using formal management control systems in shaping organizational culture.

www.manaraa.com

CHAPTER 3

Incentive Contracts and Employee-Initiated Innovation: Evidence from the Field

3.1. Introduction

Many organizations incentivize performance of front-line workers by offering compensation contracts that tie monetary payoffs to one or more output-based metrics related to standard execution tasks. At the same time, however, firms often encourage employees at all levels to propose innovative ideas that rely on first-hand knowledge of their standard tasks and contribute to improving the firm's operations. Prior literature (Hellmann and Thiele 2011; Li 2016) refers to these activities as employee-initiated innovation (hereafter: EII).[48] Incentivizing EII *directly* presents peculiar challenges, due to difficulties in planning and measuring creative activities (Grabner 2014). In this study, we examine whether and how the design of incentive contracts for employees' standard tasks influences *indirectly* their propensity to engage in EII.

EII differs from other innovation or creativity-based activities in organizations (e.g., R&D, Marketing) based on three characteristics: (1) idea proponents are not professional innovators, but rank-and-file workers whose main responsibility is to deliver on standard tasks; (2) innovation activities are appreciated by the organization but not required (i.e., failing to engage in EII is not considered to be a breach of contract); (3) opportunities for innovation are unprompted from the initiative of rank-and-file employees. To reinforce a corporate culture supportive of EII, many firms invest in dedicated information and knowledge management systems to collect, evaluate, and reward innovation initiatives proposed by employees.[49] We leverage the availability of field

[48] Examples of EII include ideas related to process improvements, cost reductions, productivity enhancements, and improvements in the work environment.

[49] Notable examples include Toyota's iconic "Creative Ideas Suggestive System", or Whirlpool's "idea labs". For examples, refer to Morgan, J. "The 5 Types of Innovation for the Future of Work. Pt 1: Employee Innovation" (https://www.forbes.com/sites/jacobmorgan/2015/07/27/the-5-types-of-innovation-for-the-future-of-work-pt-1-employee-innovation/#3d8d489e7e20). In fact, some studies estimate that ideas proposed by rank-and-file employees

www.manaraa.com

data obtained from a company that maintains a tracking system for EII, and examine whether differences in the structure of incentive contracts for the employees' standard task are associated with differences in the likelihood to engage in EII. Specifically, we consider monetary incentives with varying degrees of pay-for-performance sensitivity to the performance measure specified in the incentive contract, ranging from a fixed pay structure (low-powered incentives) to a variable pay structure (high-powered incentives).

Motivated by economic theory (Holmstrom 1989; Holmstrom and Milgrom 1991) we predict that high-powered incentives tied to standard execution tasks are less likely to stimulate EII relative to low-powered incentives. High-powered monetary incentives may fixate employees on the specific performance measures based on which their compensation is contingent (i.e., the prescribed standard task). Consequently, exerting effort on non-prescribed behaviors subject to greater payoff uncertainty, such as EII, may be associated with greater opportunity costs. Moreover, EII ideas vary in the breadth of their scope. Employees motivated to participate in EII can choose to engage in innovation activities along a spectrum ranging from ideas narrowly focused on a particular standard task to ideas benefiting a broader or different set of constituents and processes in the organization. We predict that the standard task fixation introduced by high-powered incentives constrains employees' engagement in EII to ideas that are associated with improvements in standard task performance and can, therefore, convert into future increased productivity and individual payoffs. In summary, our empirical inquiry relates to whether the intensity of incentives for the prescribed standard execution task is associated with (1) the employee's propensity to submit EII ideas, and (2) the scope of EII in relation to their standard execution task.

---

are associated with significant cost reductions. See Wall Street Journal article at https://www.wsj.com/articles/SB10001424052970204774604576631063939483984

www.manaraa.com

Our field setting provides powerful opportunities to test our predictions. First, the operations of the firm are labor intensive, and employees are hired exclusively based on expectations to perform their assigned standard execution task. These tasks are rewarded based on incentive contracts that can assume any one of the following three types: fixed pay, variable pay, or a combination of fixed and variable components. The variable component is based on output measures capturing employee performance with respect to their standard task. Second, management encourages employees at all organizational levels to submit ideas that may improve firm productivity, quality, working conditions, or reduce costs, with the prospect to receive a monetary reward upon positive evaluation by management.[50] Third, we leverage on the firm's classification of EII and group them into ideas pertaining to the employee's standard execution task (hereafter, narrow scope) versus ideas that extend beyond the employee's standard execution task (hereafter, broad scope).

Our statistical analyses produce two main findings. First, consistent with our predictions, we find that, compared to fixed pay, variable pay contracts are associated with significantly lower employee propensity to engage in EII. Second, we find that employees rewarded with variable pay propose broad scope ideas significantly less than their fixed-pay colleagues, whereas employees' propensity to propose narrow scope ideas is not significantly different across the different types of incentive contracts. Our results are robust to accounting for potential differences in the task nature, and also to including control variables capturing employee characteristics that may affect an individual's propensity to engage in EII. In additional robustness tests, we adopt an instrumental variable approach leveraging institutional details to address the concern that the assignment of

[50] The size of the monetary reward is not pre-determined and it varies depending on the expected benefit of the proposed idea. Most submissions are rewarded by management, and the reward amount ranges between 1 and 3 percent of the average worker's monthly salary depending on the usefulness of the proposed idea. We discuss the details of the reward system in Section 3.3.

www.manaraa.com

contract types may be endogenously determined. Taken together, our results suggest that high-powered incentives, by imposing high opportunity costs and increasing employee fixation on the standard execution task, can limit employee engagement in EII primarily to ideas aiming to improve the productivity and efficiency of their prescribed standard execution tasks.

Our main analyses include time and department fixed effects to control for the influence of seasonal trends and for time-invariant unobservable department characteristics. In additional tests, we relax the fixed-effect model specification, and explore organizational factors that may further influence employees' propensity to engage in EII. First, we examine the possibility that increased pressure on standard task performance (e.g., production demands) may be associated with employees' propensity to engage in EII, and find that innovation idea submissions are more common during busy production months, when process inefficiencies and opportunities for improvement are more salient to the workers. Second, we examine the role of department managers in shaping a culture of engagement in EII. We find that workers that operate under the supervision of managers who are very active in EII tend to submit more innovation ideas than colleagues operating in other departments, consistent with the importance of managers' leadership role and tone at the top in empowering subordinates to engage in extra-role behaviors (Amabile 1988). Yet, our analyses show that these leadership effects are mitigated by high-powered incentives. Within departments supervised by managers who are very active in EII, employees rewarded with variable pay are less likely to engage in EII than their fixed-pay colleagues.

Finally, we explore the impact of incentive contract structure on outcomes related to the employee's standard execution task. Since innovation is not a primary responsibility for the workers in our setting, we examine whether different contract structures and EII activities might influence the achievement of targets with respect to productivity or production quality. We observe

www.manaraa.com

no material differences in the propensity of achieving standard task-related targets that we can attribute to variation in the structure of incentive contracts or to the employee's innovation-related activity.

Our study offers the following contributions. First, we contribute to the literature on motivating employee-initiated innovation. Research has examined controls and incentive systems fostering employees' creativity, or "thinking outside-the-box" (see, for example, Cheng 2004; Kachelmeier, Reichert, and Williamson 2008; Chen, Cheng, Lo, and Wang 2015). Many of these studies were performed in laboratory settings (Drake, Haka, and Ravenscroft 1999; Webb, Williamson, and Zhang 2013; Brueggen, Feichter, and Williamson 2017; Kachelmeier, Wang, and Williamson 2019) and limited the scope of their analyses of creativity to ideas closely related to the participant's assigned task or a pre-determined problem. We leverage our field setting to expand the inquiry to a wider range of EII activities, including the discovery of opportunities for innovation and ideas that benefit a broader set of constituents. Second, our findings extend the literature that documents potential downsides of monetary incentives that are tied to specific performance measures (i.e., pay-for-performance). Prior research has associated high-powered incentives with dysfunctional behaviors (Burgess and Ratto 2003; Larkin, Pierce, and Gino 2012), including short-termism (e.g. Cheng 2004; Bolton, Scheinkman, and Xiong 2006; Kothari, Shu, and Wysocki 2009) and gaming (Baker, Jensen, and Murphy 1988; Deller, Gallani, and Sandino 2018). Our results provide evidence of an additional downside of high-powered incentives, in that they hamper pro-social behaviors such as broad-scope EII, even in the presence of additional incentives to motivate EII.

The remainder of the paper is organized as follows. In Section 3.2, we provide an overview of the relevant literature and develop our main hypotheses. We describe our research setting and

www.manaraa.com

explain the suitability of our field site to address our research question empirically in Section 3.3. Section 3.4 describes our sample and data and Section 3.5 reports the results of our main empirical tests. We validate the robustness of our results in Section 3.6 and perform additional exploratory analyses in Section 3.7. The last section concludes.

3.2. Prior Literature and Hypotheses

3.2.1. Standard Execution Tasks and Employee-initiated Innovation

Most rank-and-file employees are hired to perform a set of defined operational tasks. Organizations rely on the dependability of employee performance on these tasks and reward them based on some measure of output quantity and quality (Katz 1964). If employees were only hired as "agents" to perform a standard execution task, organizational performance could be maximized by improving task design and optimally allocating different dimensions of the task to different agents, each compensated based on performance on their assigned responsibilities (Holmstrom and Milgrom 1991). However, most executives concur that employee engagement that goes beyond what they are specifically hired for is essential to organizational success. Rather than considering employees to be "agents" that only work on prescribed tasks, organizations increasingly demand that their employees behave as "stewards" and act in the best interest of the organization (Davis, Schoorman, and Donaldson 1997; Segal and Lehrer 2012). Consistent with this view, employees are often encouraged to perform desired activities that are not prescribed by explicit incentive contracts and do not pertain to the employees' contractual responsibilities, but are vital to the survival and profitability of the organization.[51] Employee-initiated innovation is an example of these behaviors.

[51] The literature has adopted a broader definition of these activities, grouping them under the definition of "extra-role behaviors" (Katz 1964; Wright, George, Farnsworth, and McMahan 1993). Extra-role behaviors encompass a broader

www.manaraa.com

Prior research on EII highlights how these initiatives, while encouraged and often times rewarded, are generated by employees without formal assignments by their superiors (Li 2016). In general, these employees are not "full-time innovators", in that their primary responsibilities relate to standard execution tasks that require little, if any, creativity. Therefore, for these employees, pursuing innovation opportunities means going above and beyond their job descriptions (Birkinshaw and Duke 2013; Hellmann and Thiele 2011).

3.2.2. Incentives for Employee-initiated Innovation

Incentivizing EII *directly* presents peculiar challenges. In addition to being outside of the employees' explicit responsibilities, performance on EII cannot be contracted upon ex-ante because opportunities for innovation arise unplanned (Hellmann and Thiele 2011). A number of prior studies examine management control practices aimed at promoting a culture of employee-initiated innovation (Drake et al. 1999; Grabner 2014; Baumann and Stieglitz 2014). Motivated by the notion that an innovative organizational culture starts at the top (Amabile 1988), several studies explore the effectiveness of incentives for innovation at the executive level. For example, some studies recommend the inclusion of long-term oriented provisions and protections from early failure and from external pressure in the design of incentive systems (Chen et al. 2015; Cheng 2004). Moreover, controlled experiments by Ederer and Manso (2013) and Ederer (2013), as well as empirical studies (Baranchuk, Kieschnick, and Moussawi 2014; Holthausen, Larcker, and Sloan 1995; Lerner and Wulf 2007) motivated by the analytical work by Manso (2011), support the use of stock options with long vesting periods, profit sharing, and golden parachutes as effective

set of behaviors than the focus of this paper and include organizational citizenship behavior (Organ 1988) and prosocial behavior (Brief and Motowidlo 1986). Specific examples include activities that improve cooperation and collaboration, protect the organization, its assets, and its members from disaster, and constructive ideas for operational improvements (Katz 1964). We view EII as one particular type of extra-role behavior.

www.manaraa.com

incentive mechanisms for innovation. Research also posits that the role of middle managers and front-line employees is critical for a successful culture of organizational innovation because they generate innovative ideas that are informed by their first-hand knowledge, skills, and experience (Amabile 1988; Baumann and Stieglitz 2014; Holthausen et al. 1995). Yet, the use of stock options or protection devices such as golden parachutes are rarely observed in compensation contracts for rank-and-file employees.[52]

A growing body of work examines ways to *directly* enhance front-line employee engagement in the innovation process. For example, Li (2016) finds that providing employees with slack resources—specifically, time—can stimulate engagement in EII. Additionally, a number of studies use controlled laboratory experiments to examine the effectiveness of the provision of financial/non-financial incentives and goal setting as means to enhance innovation activity (Kachelmeier et al. 2008; Webb et al. 2013; Brueggen et al. 2017).[53] Notably, Grabner (2014) highlights important difficulties inherent to the use of explicit incentives for employees of creativity-dependent firms (e.g. design, media, advertising, etc.). Using survey-based evidence, the author concludes that subjectivity may be an important complement to performance-based compensation in creativity-dependent firms. The phenomenon of interest in our study (i.e., EII) shares some important characteristics with the focus of Grabner (2014), in that our research inquiry

[52] Whether the utilization of these particular forms of compensation might influence employees' propensity to engage in EII is an open empirical question that we cannot address in our setting. We encourage further research to explore alternative ways to compensate rank-and-file employees to encourage innovation activities.

[53] Due to characteristics inherent to the research method, experimental studies are limited in the types of innovation or creative behavior they can observe. The design of experiments on creativity and innovation generally involves incentives to apply creativity to improve performance on a pre-determined routine task, such as a letter decoding exercise (Brueggen et al. 2017; Drake et al. 1999), or explicitly associated with the generation of creative output, such as rebus puzzles (Kachelmeier and Williamson 2010; Brueggen et al. 2017; Kachelmeier et al. 2019). In practice, however, employee-initiated innovation encompasses a broader range of opportunities, often including operational activities that are not related to the task assigned to the employee (Unsworth 2001). Therefore, incentive systems and controls that are successful at encouraging creativity as observed in experimental settings may not directly translate to all other instances of creativity in the workplace. Our field setting allows us to complement the findings from prior literature by examining employee-initiated innovation outcomes more broadly compared to prior experimental studies.

www.manaraa.com

also deals with challenges related to motivating creative activities. However, while Grabner (2014) studies the performance of employees whose primary responsibility is to produce creative output, in our case, EII is not a contractual expectation for the employees, who are hired and paid to perform standard execution tasks. We leverage on this critical difference to examine an alternative avenue for the motivation of creative work. The goal of this study is to explore whether the design of incentive contracts for planned standard execution tasks can be used as an alternative lever to influence *indirectly* the propensity to engage in EII activities. The idea would be to generate incentives for innovation by lowering its marginal opportunity cost instead of providing direct rewards associated with the innovation task itself.

3.2.3. Standard Task Incentives and Employee-initiated Innovation

When prescribed standard execution tasks absorb almost all of employees' resources (i.e., time and effort) available at a given time, employees face a multitasking problem involving their standard task, for which metrics and compensation contracts can be defined ex-ante, and EII, for which defining a performance measure ex-ante is not possible and potential rewards will be determined ex-post (Hellmann and Thiele 2011). Economic theory suggests that, in multitasking settings, incentive compensation directs the allocation of employees' effort among their various tasks (Holmstrom and Milgrom 1991). The cost of the incentive associated with a particular task depends on the mix of tasks that the employee is expected to perform and on the characteristics of the associated performance measures (Holmstrom 1989). Economic theory posits that agents are more likely to allocate effort on aspects of performance that are less risky, easier to measure, and more directly tied to compensation payoffs (Holmstrom and Milgrom 1991).

www.manaraa.com

Five fundamental differences between the characteristics of EII and standard execution tasks are likely to influence the employee's decision to allocate effort between them: (1) EII outcomes are riskier than those associated with the standard execution task in that opportunities for innovation arise unplanned and EII exhibits lower expected probability of success than standard execution tasks; (2) the reward for innovation is more uncertain compared to the standard execution task because it is contingent on developing an idea that management finds valuable, which is determined ex-post; (3) innovation may require different skills than those needed to perform the standard execution task; (4) the evaluation of an innovation proposal is in most cases subjective, whereas standard execution tasks are in many cases associated with objective performance metrics; and (5) innovation is encouraged by management, but it is not a contractual responsibility for the employee. Consequently, we posit that, as the incentive sensitivity to the standard execution task measure increases (i.e., high-powered incentives), the opportunity cost of effort to engage in EII also increases, thus discouraging employee engagement in EII. We formulate the following hypothesis:

> ***H1: Compared to low-powered incentives, high-powered incentives are associated with lower likelihood of pursuit of EII.***

3.2.4. Choice Between Types of Employee-initiated Innovation

Not all EII activities are equal. For example, they can vary widely in their scope of applicability. Employees may leverage on their first-hand knowledge to develop improvement initiatives narrowly defined around their standard execution task (narrow scope EII). [54] Alternatively, they may propose ideas that offer broader applications and benefit a larger or different set of constituents (broad scope EII).[55] Whereas economic theory guides our prediction

[54] Examples include ideas that improve throughput, reduce production downtime, improve production flow, etc.
[55] Examples include overhead cost reduction initiatives, improvement of the general work environment, proposals for collaboration across departments, etc.

www.manaraa.com

that high-powered incentives may reduce the employee's propensity to engage in overall EII, the question about how employees decide to allocate their effort between different types of EII has received less attention.

The psychology literature (e.g. Kanfer and Ackerman 1989; Wright et al. 1993) refers to the mechanism driving the choice of effort allocation across different types of a certain activity (i.e., EII) as the individual's proximal motivation. Once an employee chooses to engage in EII, the proximal motivational process determines her distribution of EII-related effort between activities that are relatively more task-specific (i.e., narrow scope EII) and activities that are relatively less task-specific (i.e., broad scope EII).[56] We argue that the design of the incentive contracts for employees' standard tasks can interfere with the employee's proximal motivational processes, thus influencing her effort allocation decision between narrow scope and broad scope EII.[57]

Because, as argued earlier, the intensity of the incentive with respect to the standard task determines the opportunity cost of EII, we highlight several differences between narrow scope EII and broad scope EII that are relevant for the employee's effort allocation decision among *types* of EII. First, broad scope EII involves greater search costs to identify potential opportunities (e.g., understanding the conditions and constraints of the standard task of a different department) compared to narrow scope ideas for which the employee can simply leverage on her intimate knowledge of her standard task. Second, developing broad scope ideas might require skills that are not required to perform the standard task (e.g., coordinating across departments or with management). Prior research concurs that low-powered incentives are more conducive to

[56] The literature also refers to distal motivational processes which are concerned with an individual's decision to commit any or none of one's attentional resources toward attaining some goal. In our context, the decision to engage in any type of EII would be driven by distal motivation, and is equivalent to exploring H1.

[57] We note that our examination focuses on the employee's propensity to direct her effort towards a particular type of EII idea given her ex-ante considerations of a cost-benefit analysis to engage in EII. We do not incorporate considerations about the value of proposed EII ideas to the organizations as these are only settled ex-post, and do not constitute a primary factor in the employee's decision to engage in EII.

www.manaraa.com

exploration activities that may be unrelated to their standard execution task as opposed to exploitation of existing assets and skills (Amabile, 1993; Ederer, 2013; Ederer and Manso, 2013). Third, while narrow scope ideas benefit primarily the proponent, broad scope ideas involve an element of altruism. Katz (1964) and George and Brief (1992) formalize the construct of organizational spontaneity, an example of which is voluntarily performing activities to help co-workers with their standard tasks. In our setting, broad-scope EII requires greater organizational spontaneity than narrow-scope ideas. Wright et al. (1993) posit that fixation on delivering on the standard task has a negative effect on the likelihood of employees spontaneously helping other workers. Fourth, narrow scope ideas that improve standard task efficiency and productivity exhibit a more direct link to individual future compensation payoffs, compared to ideas that benefit others and may or may not convert to greater compensation in the future. As noted earlier, economic theory (Holmstrom and Milgrom 1991) predicts that workers facing effort allocation choices between activities that compete for their time and attention (i.e., the attentional resources already committed to EII) will devote more effort to activities for which the link to compensation is more explicit.

Taken together, these arguments lead us to predict that employees rewarded with high-powered incentives for their standard task will exhibit lower engagement with broad scope EII than workers paid with low-powered incentives. Not only are narrow scope ideas associated with lower search costs, in that the employee can leverage knowledge and skills they already apply to their day-to-day activities, but they are also associated with greater individual payoff potential for employees with high-powered incentives to the extent they improve the employee's standard task productivity and efficiency. We therefore formulate our second set of hypotheses as follows:

H2a: Compared to low-powered incentives, high-powered incentives are associated with greater likelihood of pursuit of narrow scope EII.

www.manaraa.com

H2b: Compared to low-powered incentives, high-powered incentives are associated with lower likelihood of pursuit of broad scope EII.

3.3. Research Setting

3.3.1. Research Site

Our field data is obtained from a Chinese manufacturing firm that produces packaging materials and supplies. The firm maintains a stable client base such that its revenue stream is largely predictable. However, production volumes exhibit seasonal fluctuations – the firm's busiest months of operations are in the summer and fall, driven by orders from two major clients, whereas production is suspended in the winter months.[58, 59] Due to the small margins typical of this industry, firm profits largely depend on its ability to maximize capacity utilization (through avoidance of quality defects and rework, reduction of machine downtime due to technical issues, etc.) and to improve cost efficiency.

The production process is organized into 11 phases, each constituting a department. Examples include the box-gluing department, the laminating department, the printing department, the storage and transportation department, etc. Employees within each department are assigned a primary task (i.e., standard task) that is crucial in maintaining the overall flow of the production process. The tasks assigned to each department differ in their nature, but are fairly comparable in terms of task complexity and can be measured using readily available performance metrics related to the volume of units processed or completed.

3.3.2. Incentive Contracts for Rank-and-File Employees

[58] This is a common practice observed in this industry and region.
[59] A typical fiscal year, therefore, could be subdivided in three periods. Idle time (i.e., winter months), busy months (i.e., summer and fall months), and regular production months (i.e., the remaining months).

www.manaraa.com

Employees are rewarded for their standard execution tasks based on explicit incentive contracts, whereby total compensation is determined by combinations of fixed and variable components. Contracts can assume one of three forms: (1) include only a fixed component (*Fixed*), (2) include only a variable component (*Variable*), or (3) include both a fixed and a variable component (*Mixed*). The variable component is determined based on the output measure that summarizes the individual's productivity in each department. Whereas employees under a *Fixed* contract are not subject to downside risk with respect to their monthly compensation, they also do not enjoy any upside potential for greater performance on the standard execution task as variation in output volumes does not translate into payoff variation. Employees under a *Variable* contract, in contrast, enjoy unbounded incentive compensation, but are exposed to downside risk as their compensation has its floor at zero. Employees under a *Mixed* contract are guaranteed a minimum fixed amount at the end of each month, and can earn additional compensation based on the performance on their standard execution task.

Institutional characteristics of our research setting allow us to empirically examine the incentive role of the different contract types. First, the bulk of the bargaining power in the hiring process rests with the firm, consistent with industry and regional norms. Accordingly, incentive contract negotiations at the time of hire are almost non-existent, and hired employees accept the contracts they are offered. Second, the type of contract offered to prospective employees largely depends on the role for which they are hired. For example, employees hired as managers are more likely to be offered a fixed contract, whereas greater variation of contract structures is observed among front-line workers.[60] In addition, the choice of contract assigned to new hires for non-

[60] In addition to the incentive role of contracts, a number of studies also propose that contracts are also associated with a sorting role in that employees with particular characteristics may self-select into a specific contract type (Kachelmeier and Williamson 2010). This is not the case in our setting.

www.manaraa.com

management roles also depends on the time of the year in which a particular employee is recruited. During the busiest months of the year, the company tends to offer volume-based variable contracts to attract workers with the prospect of high wages. During idle times, when production volumes are low, management is inclined to offer fixed contracts, which provide prospective workers with an expectation of a minimum guaranteed level of income. While the time of the year might influence the type of contract offered to the employee, it does not impact the likelihood of retention of the new hire. Moreover, in our sample period, we do not observe any within-worker change in contract type.[61] Consequently, we observe significant contract type variation within organizational roles and within departments.

3.3.3. Promotion of Employee-Initiated Innovation Activity

Due to the small margins and the labor-intensive nature of its main operations, the firm empowers its employees in all functions and at all levels of the organization to propose ideas that might improve efficiency, productivity, and profitability. Accordingly, in addition to the explicit compensation contract related to employees' standard execution tasks, the firm rewards the submission of feasible and beneficial employee-initiated innovation ideas. Not all submitted ideas are rewarded. Management evaluates each idea submission, and employees receive a monetary award only if management approves the idea as being valuable for the firm. The amount of the award is not pre-determined, but decided ex-post on a case-by-case basis. Additionally, there is no objective evaluation system for the submitted innovation ideas. Instead, management subjectively assesses how the submitted idea can potentially enhance overall firm performance. Approved ideas

[61] Additionally, we do not observe any promotions where a front-line worker assumes a managerial role during our sample period.

www.manaraa.com

are rewarded with amounts based on the expected benefit generated by the innovation and range between 1% and 3% of the proponent's monthly pay.[62]

Management classifies each submitted innovation idea into a pre-determined type. Innovation types, corresponding descriptions used to evaluate the submitted ideas, and examples of innovation ideas submitted by employees are provided in Appendix E. In consultation with company management, we grouped the types into two broad categories based on their scope of applicability—task-specific and non-task-specific innovations. Task-specific innovations include ideas that improve efficiency (e.g. speed, throughput, etc.), quality of the process (e.g. incidence of rework, defects, etc.), or standardization and streamlining of the production process (e.g. 5S initiatives). In contrast, non-task-specific innovations include suggestions that benefit the organization via improvements in activities other than the employees' standard execution tasks. Examples include initiatives that promote collaboration across teams or departments, improve the morale or culture of the organization, ideas that increase automation, reduce costs, or improve the long-term sustainability of the organization. In our study, we leverage the categorization between task-specific and non-task-specific ideas to distinguish between narrow scope EII and broad scope EII, respectively.

3.4. Research Design

3.4.1. Data

Our sample includes monthly employee-level data from March 2014 to December 2016. There are 513 unique employees, for a total of 6,016 employee-month observations. In line with local business practices, the company operates its production lines ten or eleven months each year,

[62] We do not have information about the actual rewards paid out to individual employees in our sample period.

www.manaraa.com

with January and February corresponding to idle time. For each month in the sample period, we collect information on the number, type, and quality of all submitted innovation ideas. In addition, for each employee, we obtain data on the incentive contract type and demographic characteristics. A detailed description of the variables of interest for our analyses is provided below and summarized in Appendix F.

3.4.2. Dependent Variables: Innovation and Innovation Type

We measure the employee's *propensity* to propose an innovation idea using an indicator variable ($Submission_{i,t}$) which assumes value one if employee *i* submits an innovation idea in month *t*, and zero otherwise. To analyze innovation ideas based on the classification by type used by the company, we construct indicator variables representing idea submissions for each innovation type, assuming, respectively, value one if employee *i* submitted an idea of the particular type in month *t*, and zero otherwise. There are three task-specific categories: ideas to improve standardization and streamlining of operating tasks ($Sub\_5S_{i,t}$), ideas improving the quality of the production process and lowering defects and rework ($Sub\_quality_{i,t}$), and ideas improving efficiency and throughput ($Sub\_efficiency_{i,t}$). Six non-task specific categories include ideas with long term benefits ($Sub\_lt_{i,t}$), ideas benefiting a group or a team ($Sub\_group_{i,t}$), ideas benefiting a different department ($Sub\_diffdep_{i,t}$), ideas aiming to reduce overhead costs ($Sub\_cost_{i,t}$), ideas to improve the technology, automation, and computerized systems of the firm ($Sub\_tech_{i,t}$), and ideas to improve team or group morale ($Sub\_morale_{i,t}$).

Table 3.1, Panel A, provides descriptive statistics on the innovation-related variables. Innovation submissions occurred only in about 6% of our employee-month observations. Moreover, the vast majority of submitted ideas are evaluated to be viable by management—about

www.manaraa.com

95% of the submitted ideas have subsequently been rewarded with a bonus. We proxy for the *quality* of the submitted innovation idea using the indicator variable $Approved_{i,t}$, which assumes value one if the innovation idea submitted by employee *i* in month *t* is considered to be viable and therefore is rewarded with a bonus, and zero if not. Additionally, as shown in Table 3.1, Panel B, only about 15% of the employees engage in innovation activities, suggesting a high concentration of innovation activity within a limited number of employees. We interpret the high approval percentage together with the low incidence of innovation submissions and the low percentage of "innovators" as a signal of employees being selective with respect to their engagement with innovation activities.

With respect to the different innovation types, we note a higher frequency of submission of innovation ideas aiming at reducing costs, improving efficiency, and promoting long term organizational outcomes. The ratio between submission and approval of innovation ideas is largely consistent across innovation categories.

3.4.3. Independent Variables: Contract Types

We proxy for the different types of compensation contracts with indicator variables $Fixed_i$, $Variable_i$, and $Mixed_i$, each assuming value 1 if the employee is rewarded with the corresponding type of contract, and zero otherwise. In our setting, the type of contract constitutes an employee-level time-invariant characteristic.[63] As shown in Table 3.1, Panel C, about 58 percent (13 percent) [30 percent] of all employees are compensated with a *Fixed* (*Variable*) [*Mixed*] contract.

[63] A concern might arise with respect to endogenous selections of contract type. That is, one could expect that contract structure might reflect, among other things, the propensity of the employee to generate innovative ideas. We determine that this is not the case by estimating a determinant model for the type of contract, and by implementing a 2SLS estimation of our main model using instrumental variables. Section 3.6 describes the analyses and estimation results.

www.manaraa.com

3.4.4. Control Variables: Employee Characteristics

We control for employee individual characteristics that may be associated with the employee's propensity to engage in innovation-related activities (see Table 3.1, panel C). We include $DormEmp_i$, an indicator variable assuming value one if the employee lives in company-provided housing (dormitory), and zero otherwise. Workers living in the company dormitory are generally single. Reduced commitments to family obligations and commuting time might provide these workers with more time to engage in innovation-related activities outside their assigned standard tasks. Additionally, sharing common areas, such as cafeterias, exercise facilities, or leisure spaces might increase their opportunities to exchange ideas and develop innovations collectively. About 7 percent of all employees in our sample live in dormitory facilities.

Next, we control for gender using the indicator variable $Female_i$, which assumes value one if the employee is female, and zero otherwise. About 38 percent of all employees in our sample are female. Gender is likely associated with personality traits such as creativity, extroversion, confidence, selflessness, etc., which might impact the employee's propensity to propose innovation ideas (Kachelmeier et al. 2008; Stoltzfus, Nibbelink, Vredenburg, and Thyrum 2011).

Further, we control for employee age (Age_i) measured in number of years.[64] Age may correlate with an employee's experience level and knowledge base which may, in turn, impact the ability to identify opportunities and generate innovation ideas. The average employee in our sample is about 33 years old. We also control for *Tenure*, which measures the length of the contractual relation between the organization and the employee in years. On the one hand, employees that have been with the company for a longer time might have accumulated greater firm-specific institutional and technical knowledge which they can leverage to develop valuable

[64] Age is measured at the beginning of our sample period and maintained constant over the months included in our sample.

www.manaraa.com

innovation proposals. On the other hand, relatively new hires might be in touch with more recent technological developments, organizational solutions that they might have seen in other firms, or simply hold an unbiased view of the needs and processes of the operations, which might lead them to propose fresh innovation ideas. The average tenure in our sample is 1.8 years, and spans between a minimum value of 1 year to a maximum of 17. We also control for the rank of the employee within the company. $Mgmt_i$ is an indicator variable assuming value one if the employee performs managerial functions, and zero otherwise. A managerial role within the company may be associated with better ability and/or experience, which may impact innovation-related activities. About 8 percent of all employees in our sample perform a management function.

Finally, we note that the site underwent a merger event at the beginning of 2014 (i.e., before the beginning of our sample period), which led to a change in the top management composition. The event was a friendly merger, and there were no drastic changes in the company's operations. The change in ownership, however, shifted the organizational culture toward a stronger focus on employee well-being, including the notion that a more stable income stream would allow for higher employee satisfaction resulting in greater organizational commitment. As a result, newly hired employees were more likely to be offered a fixed contract than incumbent ones. Pre-existing contracts of employees hired prior to the merger event were not modified. While interviews with the current management team indicated no explicit intent to select new hires based on their propensity to innovate, it is possible that changes in the employee selection criteria might confound our results. Therefore, we include $JoinAfterMerger_i$ as an additional control variable in all our models. This variable assumes value one if the employee was hired after the merger event and zero otherwise.

www.manaraa.com

Table 3.1
Descriptive Statistics

Table 3.1 reports the summary statistics for all variables used in the empirical tests. All variables are defined in Appendix B. Panel A reports the descriptive statistics corresponding to our complete panel data sample. In Panel A, Innovation-related variables are defined as indicator variables assuming value 1 if the employee has submitted at least one innovation idea of the indicated kinds during the month and zero otherwise, and the indicator variable *Approved* assumes value 1 if any idea submitted by the employee has been approved during the month and zero otherwise. Panel B reports the descriptive statistics relative to our data collapsed to the cross-sectional employee-level. In Panel B, Innovation-related variables are defined as indicator variables assuming value 1 if the employee has submitted at least one innovation idea of the indicated kinds during our sample period and zero otherwise (the suffix "*E*" in the variable label indicates the term "*ever*"), and the indicator variable *ApprovedE* assumes value 1 if any idea submitted by the employee has ever been approved during our sample period and zero otherwise. Panel C reports the descriptive statistics related to employee characteristics, including their contract type and demographic information.

Panel A: Panel Data

	N	mean	p50	st. dev.	min	p25	p75	max
Innovation-related Variables								
Submission	6016	0.060	0.000	0.238	0.000	0.000	0.000	1.000
Approved	6016	0.057	0.000	0.233	0.000	0.000	0.000	1.000
Sub_lt	6016	0.014	0.000	0.119	0.000	0.000	0.000	1.000
Sub_group	6016	0.009	0.000	0.094	0.000	0.000	0.000	1.000
Sub_diffdep	6016	0.003	0.000	0.055	0.000	0.000	0.000	1.000
Sub_cost	6016	0.046	0.000	0.210	0.000	0.000	0.000	1.000
Sub_tech	6016	0.005	0.000	0.068	0.000	0.000	0.000	1.000
Sub_morale	6016	0.002	0.000	0.041	0.000	0.000	0.000	1.000
Sub_5s	6016	0.007	0.000	0.083	0.000	0.000	0.000	1.000
Sub_quality	6016	0.007	0.000	0.085	0.000	0.000	0.000	1.000
Sub_efficiency	6016	0.017	0.000	0.129	0.000	0.000	0.000	1.000

Panel B: Cross-Sectional Data

	N	mean	p50	st. dev.	min	p25	p75	max
Innovation-related Variables								
SubmissionE	513	0.154	0.000	0.361	0.000	0.000	0.000	1.000
ApprovedE	513	0.152	0.000	0.359	0.000	0.000	0.000	1.000
Sub_ltE	513	0.014	0.000	0.116	0.000	0.000	0.000	1.000
Sub_groupE	513	0.031	0.000	0.174	0.000	0.000	0.000	1.000
Sub_diffdepE	513	0.023	0.000	0.151	0.000	0.000	0.000	1.000
Sub_costE	513	0.109	0.000	0.312	0.000	0.000	0.000	1.000
Sub_techE	513	0.031	0.000	0.174	0.000	0.000	0.000	1.000
Sub_moraleE	513	0.012	0.000	0.108	0.000	0.000	0.000	1.000
Sub_5sE	513	0.047	0.000	0.211	0.000	0.000	0.000	1.000
Sub_qualityE	513	0.049	0.000	0.216	0.000	0.000	0.000	1.000
Sub_efficiencyE	513	0.078	0.000	0.268	0.000	0.000	0.000	1.000

www.manaraa.com

Panel C: Employee-Level Data

	N	mean	p50	st. dev.	min	p25	p75	max
Contract-related Variables								
Variable	513	0.127	0.000	0.333	0.000	0.000	0.000	1.000
Mixed	513	0.296	0.000	0.457	0.000	0.000	1.000	1.000
Fixed	513	0.577	1.000	0.495	0.000	0.000	1.000	1.000
Employee Characteristics								
JoinAfterMerger	513	0.719	1.000	0.450	0.000	0.000	1.000	1.000
DormEmp	513	0.068	0.000	0.252	0.000	0.000	0.000	1.000
Female	513	0.382	0.000	0.486	0.000	0.000	1.000	1.000
Age	510	33.081	31.354	10.620	16.000	24.375	41.059	66.720
Mgmt	513	0.076	0.000	0.265	0.000	0.000	0.000	1.000
Tenure	513	1.816	1.000	1.319	1.000	1.000	2.091	17.000

Table 3.2 reports the correlations between all variables of interest in this study. In line with our prediction, variable contracts and mixed contracts appear to be negatively correlated with innovation submissions, while fixed contracts are positively correlated with ideas submission. Additionally, female employees and younger ones are less likely to submit ideas, while employees with longer tenure and performing management roles are more likely to engage in innovation activities. Interestingly, we note that employees that joined the company after the beginning of 2014 tend to innovate *less* than those that were already in the ranks at the time of the merger, consistent with post-merger management not explicitly selecting new hires based on their propensity to innovate.

www.manaraa.com

Table 3.2
Correlations

Table 3.2 reports the Pearson correlation coefficients among all of our variables of interest for the estimation of our statistical models. Two-tail statistical significance of the correlation coefficients is indicated as follows: * = (p<0.10); ** = (p<0.05); *** = (p<0.01).

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Submission	1.0000								
2. Sub_lt	0.4780***	1.0000							
3. Sub_group	0.3756***	0.4609***	1.0000						
4. Sub_diffdep	0.2162***	0.1718***	0.2207***	1.0000					
5. Sub_cost	0.8703***	0.5427***	0.4064***	0.2050***	1.0000				
6. Sub_tech	0.2699***	-0.0083	0.0453***	-0.0037	0.1591***	1.0000			
7. Sub_5s	0.3309***	-0.0102	0.0555***	-0.0046	0.0669***	0.1996***	1.0000		
8. Sub_quality	0.3387***	-0.0104	0.0952***	0.0667***	0.1944***	0.1948***	0.1100***	1.0000	
9. Sub_efficiency	0.5183***	0.0057	0.0558***	0.0400***	0.4180***	0.1802***	0.0972***	0.3363***	1.0000
10. Sub_morale	0.1610***	-0.0049	0.0826***	-0.0022	0.1656***	0.0572***	-0.0034	-0.0035	0.0579***
11. Variable	-0.1068***	-0.0696***	-0.0547***	-0.0244*	-0.1011***	-0.0167	-0.0251*	-0.0132	-0.0337***
12. Mix	-0.0449***	0.0482***	0.0080	-0.0129	-0.0404***	-0.0349***	-0.0083	-0.0149	-0.0543***
13. Fixed	0.1292***	0.0212	0.0409***	0.0317**	0.1205***	0.0429***	0.0285**	0.0236*	0.0734***
14. JoinAfterMerger	-0.0951***	-0.0746***	-0.0540***	-0.0148	-0.0834***	-0.0348***	-0.0467***	-0.0336***	-0.0484***
15. DormEmp	0.0007	0.0721***	0.0182	0.0020	0.0115	-0.0020	-0.0135	0.0068	-0.0166
16. Female	-0.0244*	0.0433***	0.0267**	0.0050	0.0120	-0.0458***	-0.0562***	-0.0223*	-0.0336***
17. Age	-0.0474***	-0.0246*	-0.0248*	-0.0348***	-0.0562***	0.0235*	0.0637***	-0.0202	-0.0550***
18. Mgmt	0.2293***	0.1255***	0.0848***	0.0577***	0.1897***	0.0507***	0.0941***	0.0450***	0.1233***
19. Tenure	0.0617***	0.0772***	0.0328**	0.0071	0.0689***	0.0033	0.0150	0.0035	0.0223*

	10	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*
10. Sub_morale	1.0000								
11. Variable	-0.0234*	1.0000							
12. Mix	-0.0208	-0.2933***	1.0000						
13. Fixed	0.0373***	-0.6289***	-0.5588***	1.0000					
14. JoinAfterMerger	-0.0301**	-0.4520***	0.1929***	0.2352***	1.0000				
15. DormEmp	-0.0174	0.4595***	0.0608***	-0.4481***	-0.3817***	1.0000			
16. Female	-0.0250*	0.2091***	-0.0849***	-0.1123***	-0.0565***	-0.0957***	1.0000		
17. Age	0.0038	0.3157***	-0.0132	-0.2632***	-0.2289***	0.1409***	0.1606***	1.0000	
18. Mgmt	-0.0044	-0.1914***	-0.1633***	0.2988***	-0.1850***	-0.1243***	-0.1839***	0.0287**	1.0000
19. Tenure	0.0071	0.3751***	-0.1638***	-0.1921***	-0.7691***	0.3827***	0.0079	0.2816***	0.1971***

www.manaraa.com

3.5. Empirical Results

3.5.1. Test of H1: Standard Task Incentives and Employee-initiated Innovation

Table 3.3 provides results of our tests of H1, which predicts that employees rewarded with high-powered incentives are less likely to engage in employee-initiated innovation activities. We formalize the following model:

$$Submission_{i,j,t} = \alpha + \beta_1 Variable_i + \beta_2 Mixed_i + \beta_3 JoinAfterMerger_i + \beta_4 DormEmp_i + \beta_5 Female_i + \beta_6 Age_i + \beta_7 Mgmt_i + \beta_8 Tenure_i + \sum_{t=1}^{k} \gamma_t Month_t + \sum_{j=1}^{n} \delta_j Department_t + \varepsilon \quad (1)$$

We estimate Equation (1) using logistic regression.[65] The dropped (base) case with respect to contract types is $Fixed_i$. We include month fixed effects to account for seasonality. Standard errors are clustered by department. The coefficients reported in the column (1) of Table 3.3 correspond to the estimation without department fixed effects, while in column (2) we also include department fixed effects, to further control for unobservable department-level characteristics.

In both estimations of Equation (1) reported in Table 3.3, the coefficients corresponding to our control variables are consistent across specifications.[66] For example, employees who reside in company dormitory facilities, or who perform a management function exhibit a higher propensity to submit innovation ideas. Age, gender, and tenure, however, are not significantly associated with the likelihood to submit ideas. Controlling for month and department fixed effects, the significantly negative coefficient on *Variable* (β_1= -0.903, p<0.10) suggests that employees under a variable pay contract are 71.1 percent less likely to submit innovation ideas compared to employees

[65] Our main tests involve estimations using panel data. While the contract type is defined at the employee level and it does not change over time (i.e., time-invariant employee characteristic), the characteristics of the operations in our field setting (seasonality, idle months, high productivity months) are likely to influence the likelihood of innovation activity differently in different months of operation. Nonetheless, we also estimate the model at the employee cross-sectional level which yield consistent results (untabulated).

[66] Repeating our estimations with $Approved_{i,t}$ as our dependent variable generates consistent results (untabulated).

www.manaraa.com

rewarded with *Fixed* contracts.[67] The propensity to engage in EII is not statistically different between employees under *Mixed* contracts and *Fixed* pay employees.[68] Taken together, our results support H1 and are consistent with theoretical predictions that employees with high-powered incentives on the standard tasks are less likely to pursue EII activities.[69]

[67] The coefficients are log of the odd ratio. To interpret the coefficients, we transform the log of the odds back to a probability: p = exp(0.903)/(1+exp(0.903)) = .711.

[68] We have no information about the relative weights of the fixed and variable component in mixed compensation contracts. We assume that if the fixed component is relatively large, employees under mixed contracts would behave more similarly to fixed pay employees, and more like variable pay employees if the relative weight of the variable component dominates the mix.

[69] Our results are robust to the elimination of outliers with respect to propensity to innovate. In particular, in untabulated tests, we repeat our estimation of Equation (1) excluding a particular department, where the average propensity to innovate was four times as high as the next highest department. Our results are consistent with those reported in Table 3.3. Additionally, our results are robust to dropping all managers from the sample.

www.manaraa.com

Table 3.3
Contract Type and Innovation Activities

Table 3.3 reports the coefficients estimated for Equation (1) using logit regression. *Fixed* is the base (dropped) case. Estimations in column (2) include department fixed effects. All estimations include month fixed effects and cluster standard errors by department. Two-tailed statistical significance is indicated as follows: * = p<0.10; ** = p<0.05; *** = p<0.01.

	(1) *Submission*	(2) *Submission*
Variable	-2.585***	-0.903*
	(-3.97)	(-1.95)
Mixed	-1.047**	-0.060
	(-2.08)	(-0.13)
JoinAfterMerger	-0.879*	-0.546
	(-1.78)	(-1.17)
DormEmp	1.596**	1.120**
	(1.98)	(2.51)
Female	0.356	-0.195
	(0.78)	(-0.73)
Age	-0.020	-0.011
	(-1.12)	(-0.54)
Mgmt	1.487***	0.899**
	(3.36)	(2.15)
Tenure	-0.016	-0.120
	(-0.27)	(-1.26)
Intercept	-2.717***	-4.685***
	(-4.90)	(-9.42)
N	5833	5833
pseudo R^2	0.180	0.321
Month FE	Yes	Yes
Department FE	No	Yes

3.5.2. Test of H2: Choice Between Types of Employee-Initiated Innovation

To explore the relation between incentive contract structure related to the employee's standard task and different types of EII activities, we estimate Equation (1) by specifying different dependent variables corresponding to the categories of innovation utilized by management to classify proposed ideas. Estimation results are reported in Table 3.4. Differently from our predictions (H2a), we find no significant differences between *Fixed* and *Variable* contracts with respect to employees' propensity to engage in task-specific innovation activities. While variable-

www.manaraa.com

pay employees benefit from proposing innovation ideas that improve their individual task in ways that might convert in future increased payoffs, fixed-pay employees might also draw benefits from innovation initiatives with favorable cost/benefit trade-offs. For example, fixed-pay employees can gain extra income through approved innovation idea submissions that can, at the same time, reduce their effort required to perform their standard task.

Conversely, with respect to non-task-specific innovation ideas (i.e., $Sub\_diffdep_{i,t}$, $Sub\_cost_{i,t}$, $Sub\_tech_{i,t}$), the coefficient associated with $Variable_i$ is significantly negative. Relative to *Fixed* contracts, *Mixed* contracts are significantly associated with a lower likelihood of submission of non-task-specific ideas benefiting other departments ($Sub\_diffdep_{i,t}$). These results support H2b and suggest that, compared to low-powered incentives, high-powered ones are more likely to increase the fixation on the performance measure included in the explicit incentive contract (i.e. their standard execution task) and reduce employees' motivation to engage in broad scope EII. [70]

[70] We are not able to estimate our models when the dependent variable is *Sub_morale, Sub_lt,* and *Sub_group*. The reason is that there is no variation in the type of contract associated with proponents of these types of innovation ideas. Specifically, *Variable* contracts perfectly predict each of these dependent variables. In other words, in our setting, there are no instances in which innovation idea submissions related to improving morale, benefitting the long-term, or the collective are proposed by employees under a variable contract. This further supports our prediction (H2b).

www.manaraa.com

Table 3.4
Contract Type and Innovation Scope

Table 3.4 reports the coefficients estimated for Equation (1) using the propensity to produce innovation ideas for each individual category of innovation. All estimations include month and department fixed effects, and cluster standard errors by department. The estimation of Equation (1) using *Sub_lt*, *Sub_group*, or *Sub_morale* as dependent variables is not possible, as *Variable* perfectly predicts the outcome of interest in that no employee subject to a variable pay contract submits any innovation ideas in those three categories during our sample period. Two-tailed statistical significance is indicated as follows: * = p<0.10; ** = p<0.05; *** = p<0.01.

	Task-Specific Innovations			Non-Task-Specific Innovations		
	(1)	(2)	(3)	(4)	(5)	(6)
	Sub_5s	*Sub_quality*	*Sub_efficiency*	*Sub_diffdep*	*Sub_cost*	*Sub_tech*
Variable	-0.827	-0.612	0.466	-12.366***	-1.575*	-1.647**
	(-1.09)	(-0.71)	(1.04)	(-10.66)	(-1.70)	(-2.46)
Mixed	0.588	-0.343	-0.216	-12.269***	-0.362	0.000
	(0.97)	(-0.38)	(-0.39)	(-7.54)	(-0.54)	(.)
JoinAfterMerger	-1.585	-1.360*	-0.761**	1.091*	-0.271	-1.015
	(-1.04)	(-1.65)	(-2.55)	(1.69)	(-0.48)	(-1.08)
DormEmp	-0.542	0.637	0.022	14.918***	1.911**	0.767
	(-1.47)	(1.06)	(0.06)	(11.05)	(2.29)	(0.69)
Female	-2.359**	-0.155	-0.118	-0.745	0.054	-1.237
	(-1.97)	(-0.26)	(-0.46)	(-0.66)	(0.17)	(-1.25)
Age	0.076**	-0.003	-0.040	-0.091*	-0.013	0.052**
	(2.12)	(-0.08)	(-1.61)	(-1.70)	(-0.62)	(2.12)
Mgmt	1.804**	0.463	1.219**	1.615	0.579	0.411
	(2.57)	(0.53)	(2.48)	(1.09)	(1.54)	(0.47)
Tenure	-0.224	-0.229	-0.118	0.086	-0.058	-0.105
	(-0.45)	(-1.28)	(-1.24)	(1.03)	(-0.73)	(-0.22)
Intercept	-6.493***	-4.261***	-4.231***	-2.249	-7.488***	-3.891***
	(-8.76)	(-4.50)	(-8.10)	(-1.11)	(-9.62)	(-4.91)
N	2849	3146	4571	546	5656	1185
pseudo R^2	0.294	0.129	0.276	0.129	0.410	0.131
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Department FE	Yes	Yes	Yes	Yes	Yes	Yes

Taken together, these results have significant implications for incentive contract design in organizations that intend to stimulate innovation activities among front-line employees who are predominantly engaged with core operations. In particular, the heavy focus on the standard execution task introduced by high-powered incentives can increase the opportunity cost of diverting effort to perform exploration activities and collaborations beyond the standard execution task prescribed in the compensation contract.

www.manaraa.com

3.6. Robustness Tests

Endogeneity in Contract Assignment: An Instrumental Variable Approach

A potential concern that may limit the validity of our inferences arises from the possibility that the type of incentive contract may be endogenously determined based on the employee's propensity to produce innovative ideas. We address this concern in several ways. First, interviews with management confirm that contract assignment decisions are not deliberately based on employees' potential for innovation. Specifically, management emphasized that our research setting is a manufacturing site employing workers with relatively low levels of education, and that their main responsibilities involve tasks that are fairly standard and non-innovation related. Moreover, they indicated that the variation observed in the structure of contract types largely depends on the timing of the hire during the year cycle as discussed earlier (see Section 3.3). Second, we leverage this characteristic of our field setting to re-estimate the equations used in our main tests using an instrumental variable (IV) approach, by which we predict innovation behavior using a two-stage least square (2SLS) estimation adopting the time of hire as an instrument.

We construct two instruments using indicator variables to capture the time of hire within the annual operating cycle. *JoinBusy* assumes value 1 if employee *i* was hired during the busy months of the year, and 0 otherwise. *JoinIdle* assumes value 1 if employee *i* joined the firm during the months where the operating lines are not running, and 0 otherwise.[71] We posit that the month of hire, while correlated with the type of contract offered to the prospective employee per management's description of their hiring practices, should not determine the employee's

[71] Recall that the firm experiences three types of production volumes: the winter months correspond to idle periods, the summer months correspond to the busy season, and the remaining months correspond to regular production volumes.

www.manaraa.com

propensity to innovate. In other words, to qualify as a proper instrument, each of the two selected variables needs to satisfy a validity requirement by being correlated with the endogenous regressors—the contract type—and an exclusion restriction requirement, by being uncorrelated with the error terms in the innovation behavior regressions.

Table 3.5 reports our estimation results for each of the selected instruments – Panel A corresponds to *JoinBusy* and Panel B to *JoinIdle*. In both cases we follow the same protocol. In the first stage (column (1)), we estimate the following contract determinant model including the respective instrument as a predictor:

$$ContractType_{i,j} = \alpha + \beta_1 JoinAfterMerger_i + \beta_2 DormEmp_i + \beta_3 Female_i + \beta_4 Age_i + \beta_5 Mgmt_i + \beta_6 Tenure_i + \beta_7 Instrument_i + \sum_{j=1}^{n} \delta_j Department_t + \varepsilon \quad (2)$$

where the dependent variable is an indicator variable (*Variable* in Panel A and *Fixed* in Panel B) assuming value one if the contract exhibits a *Variable (Fixed*) structure, and zero otherwise. All other variables are defined as previously described. We estimate Equation (2) using logit regressions, including department fixed effects and clustering standard errors by department. Consistent with the change in hiring policy described in Section 3.4, the coefficient associated with $JoinAfterMerger_i$ is significant, indicating a preference for offering fixed contracts for new hires. Moreover, the significant coefficient associated with $Mgmt_i$ indicates that employees with manager functions are more likely to be awarded fixed pay contracts, consistent with industry norms.[72] None of the other employee-level characteristics available to us appear to be significant determinants of the contract type.

[72] This is not surprising, given that *Variable* contracts generally assume the availability of accurate performance measures that can account for the agent's output. Whereas front-line employees at this company are assigned standard execution tasks for which output is readily measurable, management performance is difficult to assess based on volume-based performance measures, such that the incentive contracts of employees with manager functions are more likely to include a fixed component.

www.manaraa.com

In Panel A, *JoinBusy* satisfies the validity requirement, as the associated coefficient is positive and significant (β_7 = 1.008, p<0.01), confirming that employees who join the firm during busy months are more likely to be offered a *Variable* contract. Similarly, in Panel B, *JoinIdle* also satisfies the validity requirement as the associated coefficient is positive and significant (β_7 = 1.012, p<0.10) confirming that employees hired during times when production is idle are more likely to be offered a *Fixed* contract. Columns (2) and (3) report the estimation of the second stage (Equation (1)), which predicts the likelihood of innovation ideas submission. In this specification, the contract variable (*Variable* in Panel A and *Fixed* in Panel B) assumes the instrumented value from the first stage regression. We control for *Mixed* to maintain consistency with our main analyses.[73] We continue to find that employees rewarded with *Variable* (*Fixed*) contracts are less (more) likely to submit innovation ideas compared to *Fixed* (*Variable*) contract employees (column (2)). However, our results are not robust to the inclusion of department fixed effects (column (3)), likely due to the fact that different departments are more likely to hire in different periods of the annual cycle and that variation would therefore be already absorbed by the fixed effects.

We also conduct a weak instrument test,[74] and report the first-stage F-statistics on excluded instruments in columns 2 and 3. Sufficiently large *F*-statistics (i.e., *F* greater than 23 – see Olea and Pflueger (2013) allow us to reject the null that the instruments are weak. In columns (4) and (5) we provide evidence of a satisfactory exclusion restriction, by showing that *JoinBusy* (*JoinIdle*)

[73] We use Stata to perform all our estimations. The 2SLS procedure in Stata does not allow to instrument both variables ("*Variable* and *Mixed*" or "*Fixed* and *Mixed"*) in the second stage regression. Since our hypotheses are formulated to contrast low-powered and high-powered incentives, we chose to instrument *Variable (Fixed)* and control for *Mixed.* However, estimations of the IV model dropping all observations corresponding to *Mixed* contracts provide consistent results (untabulated).

[74] The concern is that the standard errors on the IV estimates are likely to be much larger if the excluded instrumental variables are only weakly correlated with the endogenous regressors.

www.manaraa.com

is not correlated with the error term of the estimation of Equation (1).[75] Additionally, having two orthogonal instruments while having only one endogenous regressor (i.e., contract type) allows us to conduct an overidentification test to further determine if the instruments satisfy the exclusion restriction. The Hansen-Sargan *J*-statistic for the over-identification test has a *p*-value of 0.809, by which we reject the null hypothesis that both instruments are uncorrelated with the error term of the main regressions. Collectively, our results reduce the endogeneity concern with respect to the relation between contract type and innovation.

[75] We re-estimate the 2SLS estimation using a different specification of our instrumental variable. Specifically, we construct an ordinal variable (*JoinPeriod*) assuming value -1 if the employee is hired during busy months, value 0 if the employee joins the firm in regular production months, and value +1 if the employee is hired during idle months. Untabulated estimations provide equivalent results to those reported in Table 3.5.

www.manaraa.com

Table 3.5
Robustness Test: Instrumental Variable

Table 3.5 reports the coefficients of the 2SLS estimation of Equation (1). Panel A reports estimations adopting as instrument *JoinBusy*, an indicator variable assuming value 1 if the month in which employee *i* is hired is a busy month, and 0 otherwise. Panel B reports estimations adopting as instrument *JoinIdle*, an indicator variable assuming value 1 if the month in which employee *i* is hired is an idle month, and 0 otherwise. In both panels, column (1) reports the estimation results of the first stage (Equation (2)), while columns (2) and (3) report the results of the second stage estimation, where variable *Variable (Fixed*) in Panel A (Panel B) assumes instrumented values from the first stage, and we control for *Mixed* to maintain consistency with our main tests. Column (2) does not include department fixed effects, while column (3) does. Columns (4) and (5) provide evidence of satisfactory exclusion restrictions for each instrument and differ by the inclusion of department fixed effects (present in column (5) but not in column (4)). All estimations include month fixed effects and are cluster standard errors by department. The Sargan J statistic for the over-identification test has a *p*-value of 0.809, based on which we are unable to reject the null hypothesis that both instruments are not correlated with the error term of the main regressions, further satisfying the exclusion restriction. Two-tailed statistical significance is indicated as follows: * = p<0.10; ** = p<0.05; *** = p<0.01.

Panel A: Instrument *JoinBusy*

	First Stage	**Second Stage**		**Exclusion Restriction**	
	(1)	(2)	(3)	(4)	(5)
DV	*Variable*	*Submission*	*Submission*	*Submission*	*Submission*
Variable		-11.549**	-4.658	-2.599***	-0.918**
		(-2.39)	(-1.31)	(-3.97)	(-1.98)
Mixed		-3.748**	-1.883	-1.047**	-0.047
		(-2.44)	(-1.21)	(-2.04)	(-0.10)
JoinAfterMerger	-2.488***	-3.360**	-1.612	-1.107**	-0.628
	(-2.97)	(-2.48)	(-1.50)	(-2.04)	(-1.47)
DormEmp	1.714	5.037**	1.778	1.752**	1.180**
	(1.50)	(2.53)	(1.63)	(1.98)	(2.46)
Female	0.481	1.374**	0.293	0.377	-0.174
	(0.38)	(2.39)	(0.85)	(0.81)	(-0.66)
Age	0.042	0.072*	0.009	-0.019	-0.010
	(1.30)	(1.84)	(0.79)	(-1.01)	(-0.53)
Mgmt	-1.595	-2.111	-0.125	1.489***	0.899**
	(-1.35)	(-1.55)	(-0.24)	(3.47)	(2.15)
Tenure	0.063	-0.245**	-0.125*	0.001	-0.109
	(0.40)	(-1.98)	(-1.90)	(0.01)	(-1.15)
JoinBusy	1.008***			-0.517	-0.187
	(2.70)			(-1.11)	(-0.51)
Intercept	-2.002*	-0.603	-0.331	-2.541***	-4.625***
	(-1.94)	(-1.08)	(-0.19)	(-4.21)	(-7.92)
Weak Instrument Test (F-statistic)		139.98	229.25		
N	419	5866	5833	5833	5833
pseudo R^2	0.508			0.185	0.321
Month FE		Yes	Yes	Yes	Yes
Department FE	Yes	No	Yes	No	Yes

www.manaraa.com

Panel B: Instrument *JoinIdle*

	First Stage	Second Stage		Exclusion Restriction	
	(1)	(2)	(3)	(4)	(5)
DV	*Fixed*	*Submission*	*Submission*	*Submission*	*Submission*
Fixed		4.808***	0.299	2.523***	0.903*
		(4.81)	(0.12)	(4.06)	(1.94)
Mixed		3.199***	0.323	1.507	0.849*
		(4.63)	(0.23)	(1.46)	(1.79)
JoinAfterMerger	1.259**	-1.458***	-0.298	-0.859	-0.546
	(2.48)	(-4.87)	(-0.39)	(-1.62)	(-1.17)
DormEmp	-2.967*	2.272***	0.449	1.716*	1.130**
	(-1.65)	(5.27)	(0.58)	(1.91)	(2.30)
Female	0.596	0.582***	-0.117	0.389	-0.192
	(1.33)	(4.30)	(-0.47)	(0.83)	(-0.72)
Age	-0.014	0.018**	-0.004	-0.017	-0.010
	(-0.64)	(2.06)	(-0.47)	(-0.90)	(-0.55)
Mgmt	3.439***	-0.235	0.502	1.544***	0.902**
	(3.19)	(-0.81)	(1.36)	(3.48)	(2.24)
Tenure	0.075	-0.096**	-0.068	-0.045	-0.121
	(0.37)	(-2.08)	(-1.24)	(-0.92)	(-1.30)
JoinIdle	1.012*			0.824	0.044
	(1.77)			(1.39)	(0.08)
Intercept	-1.434**	-5.991***	-2.731**	-5.481***	-5.601***
	(-2.48)	(-6.21)	(-2.04)	(-5.45)	(-8.01)
Weak Instrument Test (F-Statistic)		235.90	340.91		
N	422	5866	5833	5833	5833
pseudo R^2	0.386			0.188	0.321
Month FE		Yes	Yes	Yes	Yes
Department FE	Yes	No	Yes	No	Yes

3.7. Additional Analyses

3.7.1. Innovation Activity in Busy Months

In this section we explore how the standard task business cycle might influence the relation between incentive contract structure and propensity to engage in EII. As mentioned in Section 3.3, in our setting, production is subject to seasonal variations, whereby certain months are systematically busier than others. The main effect of busy production months on the propensity to engage in innovation activities is uncertain *a priori*. On the one hand, busy months may require employees to devote all their time and effort to fulfilling demand at the expense of engagement in

www.manaraa.com

EII which is not directly associated with the attainment of production targets. During months with lower production requirements, employees might have more time to think about and develop their innovation ideas. On the other hand, however, the increased pressure associated with busy production months might highlight inefficiencies and opportunities for improvement, thus leading to a higher incidence of submissions of innovation ideas. These opportunities might be obfuscated by the availability of slack resources during quieter months.

To examine how engagement in EII varies with the standard task business cycle, and whether the incentive contract structure affects this relation, we relax our main model specification and exclude time-fixed effects. Instead, we include the variable *BusyMonth*, defined as an indicator coded as 1 if month *t* falls in a period of high production volumes and zero otherwise, and estimate the following model:

$$Submission_{i,j,t} = \alpha + \beta_1 Variable_i + \beta_2 Mixed_i + \beta_3 BusyMonth_t + \beta_4 Variable_i * BusyMonth_t + \beta_5 Mixed_i * BusyMonth_t + \beta_6 JoinAfterMerger_i + \beta_7 DormEmp_i + \beta_8 Female_i + \beta_9 Age_i + \beta_{10} Mgmt_i + \beta_{11} Tenure_i + \sum_{j=1}^{n} \delta_j Department_j + \varepsilon \quad (3)$$

We estimate Equation (3) using logit regression, including department fixed effects and clustering standard errors by department. Results reported in Table 3.6 indicate that, on average, EII is more likely to happen during busy production months, consistent with the view that greater performance pressure on the standard task might highlight process inefficiencies and other frictions, thus increasing employee awareness of opportunities for improvement. Additionally, while variable pay contracts are associated with lower EII incidence overall (consistent with our main results), we do not find any incremental effect of incentive contract structure on EII during busy months suggesting that the effect of incentive contract structure on EII is not exacerbated by increased pressures on the standard task.

www.manaraa.com

Table 3.6
Busy Months and Innovation Activities

Table 3.6 reports the coefficients estimated for Equation (3) using logit regression. *Fixed* is the base (dropped) case. The variable *BusyMonth* is an indicator coded as 1 if month *t* is a month of high production volumes and 0 otherwise. The estimation includes department fixed effects and clusters standard errors by department. Two-tailed statistical significance is indicated as follows: * = p<0.10; ** = p<0.05; *** = p<0.01.

	Submission
Variable	-0.931*
	(-1.88)
Mixed	-0.725
	(-0.95)
BusyMonth	0.373***
	(2.68)
*Variable*BusyMonth*	-0.126
	(-0.28)
*Mixed*BusyMonth*	1.083***
	(2.13)
JoinAfterMerger	-0.670*
	(-1.92)
DormEmp	1.238***
	(2.62)
Female	-0.181
	(-0.68)
Age	-0.012
	(-0.62)
Mgmt	0.897**
	(2.35)
Tenure	-0.216**
	(-2.18)
Intercept	-3.397***
	(-4.72)
N	5978
pseudo R^2	0.288
Department FE	Yes

3.7.2. Managerial Engagement in EII

In this section we explore the role of department managers' EII engagement on the innovation activity of their subordinates. *A priori*, it is unclear how subordinates' EII activity is associated with that of their managers. Department managers can contribute to shaping a department culture where subordinates are empowered and encouraged to engage in EII. Their

www.manaraa.com

leadership role may serve as a conduit to transmit the organizational culture set by the top management team as daily interactions of rank and file employees are primarily with their department managers. Alternatively, even when subordinates might identify opportunities for innovation, department managers might exploit their position of power to attribute subordinates' innovation ideas to themselves and, consequently, extract benefits both in terms of monetary rewards associated with approved ideas, but also in terms of reputation and signaling to upper level management.

To explore the influence of department managers on employees' propensity to engage in EII, we relax our main model specification excluding department-fixed effects. Instead, we include the variable *ManagerHighSub*$_j$, an indicator variable coded as 1 if the manager of Department *j* submits more innovation ideas in our sample period than the median number of submissions by managers, and zero otherwise, and estimate the following model:

$$Submission_{i,j,t} = \alpha + \beta_1 Variable_i + \beta_2 Mixed_i + \beta_3 ManagerHighSub_j + \beta_4 Variable_i * ManagerHighSub_j + \beta_5 Mixed_i * ManagerHighSub_j + \beta_6 JoinAfterMerger_i + \beta_7 DormEmp_i + \beta_8 Female_i + \beta_9 Age_i + \beta_{10} Tenure_i + \sum_{t=1}^{k} \gamma_t Month_t + \varepsilon \quad (4)$$

In order to isolate the effect of the manager's activity on their subordinates' EII, we exclude all managers from our sample. That is, we only include observations related to subordinates, and classify subordinates as reporting to a manager with high (low) innovation activity depending on the department to which they belong.

Table 3.7 summarizes our results. We estimate Equation (4) using logit regression with standard errors clustered by department. The main effect associated with the variable *ManagerHighSub* indicates that subordinates working under a manager that submits a high number of innovation ideas exhibit greater engagement in EII compared to colleagues that operate under

www.manaraa.com

managers with lower submission activity. This is consistent with the importance of the managers' leadership role and tone at the top in empowering subordinates to engage in EII (Amabile 1988). However, we find that this effect is mitigated when subordinates are rewarded with variable contracts, suggesting that the leadership effect of managers proactively engaging in EII is attenuated by high-powered incentives that increase standard task fixation and, thus, discourage EII.

www.manaraa.com

Table 3.7
Manager Innovation Activities and Employee Innovation Activities

Table 3.7 reports the coefficients estimated for Equation (4) using logit regression. *Fixed* is the base (dropped) case. The variable *ManagerHighSub* is an indicator variable coded as 1 if the manager of Department *j* submits more innovation ideas in our sample period than the median number of submissions by managers, and 0 otherwise. For the purpose of this analysis we restricted the sample to non-manager employees. The estimation includes month fixed effects and clusters standard errors by department. Two-tailed statistical significance is indicated as follows: * = p<0.10; ** = p<0.05; *** = p<0.01.

	Submission
Variable	-2.237***
	(-2.76)
Mixed	-1.359
	(-1.42)
ManagerHighSub	1.236*
	(1.85)
Variable ManagerHighSub*	-1.583*
	(-1.68)
Mixed ManagerHighSub*	1.174
	(1.05)
JoinAfterMerger	-0.997**
	(-2.46)
DormEmp	2.000**
	(2.33)
Female	0.325
	(0.71)
Age	-0.058*
	(-1.90)
Tenure	0.103
	(0.65)
Intercept	-2.916***
	(-4.15)
N	5061
pseudo R^2	0.209
Month FE	Yes

3.7.3. Incentive Contracts and Standard Execution Task Outcomes

Our main analyses show that low-powered incentives are associated with greater employee engagement in EII. We have argued that low-powered incentives result in lower fixation on the prescribed standard task specified in the incentive contract allowing employees to engage in EII. However, if such effects came at the cost of lower performance on the prescribed standard

www.manaraa.com

execution task, the trade-off between greater engagement in EII and standard task performance could be unfavorable. To address this concern, we examine the relation between incentive contract type and two key performance outcomes related to the employee's standard execution task, namely the likelihood of meeting operational targets and the incidence of production quality issues. In our setting, each month, management flags individual employees as having met (or not) their assigned targets.[76] We use this information to create an indicator variable $Met_{i,t}$ which assumes value one if employee *i* met or exceeded their budgeted output in month *t*, and zero otherwise. Additionally, management monitors employee contribution to production quality by tracing quality defects and complaints to the employees that participated in the production process associated with the quality issue. Relevant employees are flagged in the company's information system every time a complaint is filed. We construct an indicator variable ($BadQuality_{i,t}$), which assumes value 1 if employee *i* is flagged for quality issues in month *t* and zero otherwise. Table 3.8 reports the logit estimations of the following model:

$$Outcome_{i,j,t} = \alpha + \beta_1 Variable_i + \beta_2 Mixed_i + \beta_3 Submission_{i,t} + \beta_4 JoinAfterMerger_i + \beta_5 DormEmp_i + \beta_6 Female_i + \beta_7 Age_i + \beta_8 Mgmt_i + \beta_9 Tenure_i + \sum_{t=1}^{k} \gamma_t Month_t + \sum_{j=1}^{n} \delta_j Department_t + \varepsilon \quad (5)$$

The dependent variable (*Outcome*) is substituted by each of our proxies measuring productivity and quality, respectively. The results show no significant differences between *Fixed* and *Variable* contracts with respect to each of the selected standard task-related outcome. We find that *Mixed* contracts are associated with lower likelihood of meeting operational targets compared to *Fixed* contracts. Additionally, engagement in EII, proxied by the variable *Submission*, does not exhibit

[76] Unfortunately, we do not have information about the magnitude of the targets or the actual levels of performance exhibited by individual employees.

www.manaraa.com

any significant relation with the likelihood of meeting expectations with respect to productivity and quality. Taken together, our results suggest that, while EII may compete with standard tasks for front-line workers' time and effort, empowerment to engage in EII does not necessarily introduce an unfavorable tradeoff with meeting targets associated with their primary responsibilities.

www.manaraa.com

Table 3.8
Contracts Type and Standard Execution Tasks Outcomes

Table 3.8 reports the coefficients of Equation (5) estimated using logit regression and adopting different dependent variables representing important organizational outcomes. Respectively, columns (1-3) report the estimation of Equation (5) using the dependent variable $Met_{i,t}$, an indicator variable assuming value 1 if employee *i* met or exceeded her assigned target in month *t* and zero if the employee *i* missed the target; Columns (4-6) report the estimation of Equation (5) using the dependent variable $BadQuality_{i,t}$, an indicator variable assuming value 1 if the activity for which employee *i* is responsible was associated with a quality complaint in month *t* and zero otherwise. All estimations include month fixed effects and department fixed effects and cluster standard errors by department. Two-tailed statistical significance is indicated as follows: * = p<0.10; ** = p<0.05; *** = p<0.01

	(1) *Met*	(2) *Met*	(3) *Met*	(4) *BadQuality*	(5) *BadQuality*	(6) *BadQuality*
Variable	-0.045		-0.042	-0.554		-0.553
	(-0.19)		(-0.18)	(-1.42)		(-1.42)
Mixed	-0.340***		-0.340***	0.065		0.065
	(-2.67)		(-2.71)	(0.60)		(0.59)
Submission		0.207	0.211		0.134	0.117
		(0.83)	(0.84)		(0.78)	(0.76)
JoinAfterMerger	0.173	0.236	0.171	-0.007	0.175	-0.005
	(0.46)	(0.67)	(0.46)	(-0.02)	(0.38)	(-0.01)
DormEmp	0.354	0.285	0.353	0.206	0.105	0.205
	(0.88)	(0.71)	(0.87)	(0.98)	(0.36)	(0.98)
Female	0.181*	0.175*	0.182*	-0.576	-0.592	-0.573
	(1.76)	(1.77)	(1.78)	(-1.12)	(-1.30)	(-1.11)
Age	-0.006	-0.006	-0.006	0.008	0.006	0.008
	(-0.43)	(-0.41)	(-0.42)	(0.90)	(0.64)	(0.90)
Mgmt	0.282	0.266	0.268	-0.061	0.053	-0.068
	(1.40)	(1.32)	(1.28)	(-0.10)	(0.11)	(-0.12)
Tenure	-0.165	-0.131	-0.167	0.057	0.046	0.058
	(-1.04)	(-0.91)	(-1.04)	(0.39)	(0.28)	(0.39)
Intercept	-3.957***	-4.176***	-3.937***	-2.562***	-2.709***	-2.563***
	(-4.16)	(-4.20)	(-4.11)	(-5.66)	(-5.06)	(-5.66)
N	5799	5799	5799	5672	5672	5672
pseudo R^2	0.072	0.071	0.072	0.139	0.134	0.139
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Department FE	Yes	Yes	Yes	Yes	Yes	Yes

3.8. Conclusions

In this study, we empirically examine the relation between the design of incentive contracts for employees' standard execution tasks, and their propensity to engage in employee-initiated innovation (EII). We obtained field data from a company that tracks EII idea submissions using a

www.manaraa.com

dedicated information system. We find theory-consistent evidence suggesting that employees rewarded for standard execution tasks with high-powered incentives exhibit lower propensity to submit innovation ideas compared to employees with low-powered incentives. High-powered incentives for well-defined standard tasks that have explicit links to monetary rewards increase the opportunity cost of engaging in activities that are associated with greater uncertainty in their outcomes and payoffs and for which performance measures are difficult to define and contract upon ex-ante.

We further distinguish between different types of EII activities—task-specific (narrow scope) ideas, reflecting suggestions directly related to the proponent's standard execution task, and non-task-specific (broad scope) ideas, related to improvement opportunities for organizational aspects unrelated to the execution task assigned to the proposing employee. We show that high-powered incentives are associated with lower propensity to engage in broad-scope innovations that extend beyond the employee's standard execution task. We infer that high-powered incentives may discourage innovation activity by increasing the fixation on the standard task so that, even when employees are motivated to engage in EII, they limit their effort to ideas that exhibit lower search costs and may convert into future higher individual payoffs through improved standard task productivity. Our findings extend the nascent literature on employee-initiated innovations and highlight the potential for unintended consequences resulting from high-powered incentives: the restriction of EII activities to improvements of standard execution tasks and lower engagement in innovation activities that may benefit a larger set of constituents in the organization. In exploratory tests, we also document how EII activity is more likely to be observed during times of added pressure to perform on the standard task, in which opportunities for improvement become more salient, as well as when department managers implement a culture of engagement in EII.

www.manaraa.com

This research is subject to limitations that are common to many archival field studies. First, external validity concerns arise from the fact that we use information pertaining to a single organization, and our results might therefore be influenced by idiosyncratic characteristics of the field setting. Second, we are restricted by the contract types in use at the research site. While the observed contracts allow us to compare low-powered versus high-powered monetary incentives, alternative contract types, performance measures, or reward types (not observed in our setting) may be better suited to encourage EII activities. Third, we only have limited information about the internal mix of fixed and variable components of the mixed contracts, which prevents us from making strong inferences with respect to the consequences of adopting such a hybrid contract design. Despite these limitations, our study sheds new light on how the strength of incentives associated with prescribed standard execution tasks can influence the propensity to engage in EII. Research on potential levers of control that can improve employee engagement in desired activities beneficial to firm performance but are not prescribed as part of the employee main responsibilities (Wright et al. 1993) is relatively scant. Additionally, our finding that low-powered incentives are more likely to induce EII ideas of broader scope provides insights into the effectiveness of looser management control systems to foster pro-organizational employee behaviors. We encourage future research to further explore additional management control practices and systems that can stimulate EII in a broader spectrum of organizations and cultural settings.

www.manaraa.com

CHAPTER 4

Nominal and Opportunity Effects of Managerial Discretion

4.1. Introduction

Many organizations incorporate managerial discretion in employee compensation decisions.[77] Prior research describes a number of potential benefits, especially when complete contracting is impeded by environmental unpredictability or by noise in the measurement of performance.[78] Nonetheless, managers use discretionary adjustments in performance evaluations less frequently than theory would predict (e.g. Höppe and Moers 2011; Woods 2012; Bol et al. 2015). Among the proposed reasons is the concern about the motivational effects of applying managerial discretion, especially when performance-related payoffs are interdependent – that is, when subjective adjustments giving rewards or penalties to some employees cause others not to get them (Bol et al. 2015).[79] In this study, we explore this possibility by examining whether and how the use of managerial discretion relates to future employee performance and show that compensation interdependence gives rise to two distinct performance effects of managerial discretion: a *nominal effect* and an *opportunity effect*.[80] The former refers to performance effects of discretionary adjustments associated with employees who directly gained (lost) by being given

[77] The terms managerial discretion and subjectivity are used interchangeably in this study.
[78] See, for example, Baiman and Rajan (1995); Baker et al. (1994); Ittner et al. (2003); Gibbs et al. (2004); Ederhof (2010); Höppe and Moers (2011); Bol et al. (2015).
[79] For example, employee performance evaluations and compensation decisions are highly interdependent in the presence of bonus pools or forced rankings (or tournaments); positive discretionary adjustments to one employee's compensation automatically implies negative adjustments to someone else's. Bol et al. (2015) provide experimental evidence that supervisors are less likely to apply discretionary adjustments when a positive adjustment to one set of employees is experienced by others as a missed adjustment and, therefore, as a negative outcome. Their results suggest that supervisors operating in high-interdependence conditions consider potential demotivating effects arising from missing out on a potential reward due to the application of positive discretionary adjustments benefiting others.
[80] Prior studies document empirical evidence consistent with the use of managerial discretion being associated with future performance (e.g. Hayes and Schaefer 2000, Gibbs et al. 2004, Ederhof 2010, Abernethy et al. 2019). However, these studies do not address the effect of payoff interdependence on the relations they document.

www.manaraa.com

a reward (penalty) subjectively.[81] The latter relates to the performance effects associated with employees who, due to managerial discretion, did *not* receive a reward (penalty) which was given to someone else.

Our empirical inquiry leverages on data from a company that operates an incentive system whereby, in each month, the members of the department with the highest performance receive a monetary bonus, while the members of the worst-performing department are penalized with pay deductions. As it is common to most organizations, objective performance of each department is disclosed internally to the organization via a dashboard of KPIs.[82] The reward/penalty decision, however, is made by top executives, who can integrate the objective performance information with subjective assessments. In many cases, these subjective evaluations lead management to assign the rewards (penalties) to departments that did *not* rank first (last) based on the disclosed operational dashboard.[83] The information about which department receives the reward or penalty is available to the whole organization. This setting allows us to measure both the nominal and opportunity effects resulting from managerial discretion. Examining changes in performance of workers who received a reward (penalty) without scoring the best (worst) operational performance (hereafter, *actual* recipients) sheds light on the nominal effect, whereas examining changes in performance subsequent to *not* receiving rewards (penalties) despite ranking first (last) based on objective metrics (hereafter, *would-be* recipients) allows us to observe the opportunity effect. We note that

[81] Prior empirical work, including studies focusing on discretionary components in the CEO compensation literature (e.g., Ederhof 2010) primarily examine the nominal effect, as it is difficult (or irrelevant) to identify potential stakeholders who were affected due to the use of subjectivity in rewarding CEOs.
[82] Key Performance Indicators.
[83] In this study, we focus on ex-post discretionary adjustments of objective performance measurement, whereby managers can decide whether and how they might use subjective assessments in determining performance-related payoffs for subordinates. Subjectivity in performance evaluations can assume different forms. Managers can include explicit subjective performance metrics in evaluating performance (e.g., formalized assessments of how effectively senior employees mentor junior ones), they can subjectively determine the distribution of relative weights within the mix of performance metrics, and they can adjust their objective measurement of performance ex-post on the basis of information about factors and events that were not predictable or contractible ex-ante (Bol 2007; Campbell 2008).

www.manaraa.com

our setting is similar to any organization in which workers observe objective performance (e.g., via scorecards, dashboards of KPIs, etc.) and the allocation of performance-related payoffs is interdependent (e.g., bonus pool allocations) and based on a combination of objective and subjective evaluations.[84]

Our empirical analyses indicate that discretionary adjustments are indeed related to future performance. Specifically, we find evidence of the nominal effect in that actual recipients of subjective rewards (penalties) subsequently perform better (worse). We also document performance effects consistent with the opportunity effect of managerial discretion. Specifically, performance of would-be recipients of a reward declines, while that of would-be recipients of a penalty improves. These findings can be interpreted by a number of theories, which propose information-based and/or motivation-based explanations. Information-based explanations refer to the notion that the use of managerial discretion may capture information about non-contractible factors that are subsequently reflected in future performance. Motivation-based explanations refer to the notion that the use of managerial discretion may *affect* employee future effort depending on how such adjustments are perceived by the employee.

Whereas prior empirical studies leverage on information-based explanations to describe the relation between the use of managerial discretion and subsequent performance (e.g. Hayes and Schaefer 2000; Ederhof 2010), we also document evidence consistent with motivation-based explanations. First, we examine the persistence of performance consequences associated with nominal and opportunity effects and show that, subsequent to discretionary adjustments in period

[84] Settings like these are very common in practice and have been described on prior research. For example, both Ederhof (2010) and Rajan and Reichelstein (2009) have assumed in their respective models that agents are evaluated on a combination of subjective and objective assessments. The interdependence between payoffs is common to all settings where there is a bonus pool. Scholars have included this institutional assumption in their models (e.g., Rajan and Reichelstein 2009) and acknowledged it as a characteristic of their empirical settings (Abernethy et al 2019; Bol et al 2015).

www.manaraa.com

t, nominal effects observed in period *t+1* reverse or disappear in period *t+2*, whereas opportunity effects persist. Second, we examine the variation in the intensity of the opportunity effect by expanding the definition of would-be recipients to *any* department that ranked higher (lower) than the actual recipient of the subjective reward (penalty) with respect to the observable metrics. We observe, on average, a significant opportunity effect for those departments that ranked below the punished one and were, therefore, "saved" from a potential penalty, whereas departments that were deprived of a potential reward do not exhibit significant changes in performance unless they ranked first. Taken together, these asymmetries with respect to the performance effects of managerial discretion are difficult to explain solely based on the information-based explanation, whereby the use of managerial discretion relates to non-contractible factors that are reflected in future performance.

We conduct additional tests to address concerns about possible alternative explanations for our results. First, we show that subjective adjustments are not correlated with observable departmental characteristics, alleviating concerns that management's discretion might reflect discrimination toward certain functions or groups of workers (Prendergast and Topel 1993, Woods 2012). Another concern is the possibility that management might use discretionary adjustments to make up for having set excessively difficult (easy) targets. In our setting, monthly targets are set annually and are not renegotiated during the year. If discretion was used simply to correct for unrealistic targets, we should observe different trends in its use at particular times of the year, especially in the late months. We find no evidence of such trends. Next, we explore whether performance changes associated with the nominal effect of subjectivity might be driven simply by the wealth effect of receiving a reward (penalty), independent of its subjective or objective allocation by management. Our tests show that subsequent performance effects are observed only

www.manaraa.com

in the presence of subjectively assigned rewards and penalties, while the allocation of rewards and penalties based on the objective rankings alone does not appear to drive changes in subsequent performance. Lastly, we examine whether the opportunity effects of subjectivity might simply depend on being ranked at the top or at the bottom. If that were the case, observed performance effects might be due to mean reversion or, alternatively, to relative performance information, independent of not receiving an expected reward or penalty. Results of our analyses are inconsistent with this alternative explanation.

In an effort to further examine motivation-based explanations for performance consequences of managerial discretion, we also design a randomized controlled experiment creating a laboratory setting that is not confounded by the information-based explanation. In particular, we recruit participants through Amazon's Mechanical Turk (M-Turk) and expose them to a workplace scenario in which the incentive system closely reproduces the one in our field setting. Participants are randomly assigned to conditions reflecting different performance evaluation outcomes. In each condition, they learn how their team ranked in the month that just ended based on objective performance metrics and whether their team had received a reward or a penalty. Each participant then indicates how much they would change their effort in the upcoming month and provides reasons that motivate their choice using free-text answers. The results of the experiment provide corroborating evidence of motivational effects of managerial discretion in the presence of payoff interdependence, and that such effects are predominantly due to the perceived credibility of the incentive system (Lawler 1971; Folger and Konovsky 1989; Baker et al. 1994; Gibbs et al. 2004).

Our study contributes to the literature and to the practice of designing incentives involving managerial discretion. We extend prior research on the relation between subjective allocations of

www.manaraa.com

performance-related payoffs and subsequent performance (e.g. Hayes and Schaefer 2000, Ederhof 2010) by showing that the documented relation is not entirely explained by managers accounting for non-contractible performance factors then reflected in future performance (information-based explanation) but also by a motivation effect (i.e., a change in effort associated with belief revisions with respect to the strength of the relation between effort and payoffs). Additionally, while prior empirical research (e.g. Ederhof 2010; Abernethy et al. 2019) has primarily focused on incentive effects related to members of the organization who are *directly* affected by managerial discretion—that is, who *receive* a reward (penalty) subjectively—we explore the consequences of managerial discretion for workers who are *indirectly* affected by the subjective decision via opportunity effects—that is, who *fail to receive* a reward (penalty) as a result of managerial discretion (i.e., opportunity gains and losses). While the possibility of these effects has been discussed in the literature (e.g., Moers 2005; Bol et al. 2015), our study is the first, to the best of our knowledge, to provide empirical evidence of the opportunity effect of the use of subjectivity in performance evaluation and rewarding practices.

The paper proceeds as follows: in Section 4.2, we review relevant literature and formulate our predictions. Section 4.3 describes the field setting and the data. Section 4.4 details the research design and reports the results of statistical tests. In Section 4.5, we present the results of our tests of possible alternative explanations. In Section 4.6, we provide additional results from our randomized controlled experiment. Section 4.7 concludes.

4.2. Literature Review

4.2.1. Nominal and Opportunity Effects of Managerial Discretion

www.manaraa.com

Prior studies exploring the relation between subjective evaluations and future employee performance pay little (if at all) attention to the interdependence among employees' payoffs. Analytical models (Hayes and Schaefer 2000; Ederhof 2010) assume that the manager commits to paying a pre-determined total bonus amount (i.e., bonus pool) regardless of the performance of the individual employee (credibility assumption), whereby performance evaluation will determine the allocation of a commensurate portion of the bonus pool to the employee, while the remainder will be paid off to a third party, which operates as a residual claimant.

However, in most empirical settings where performance pay is based on a bonus pool, there is no residual claimant. Instead, the bonus pool is allocated among a certain number of employees based on the distribution of their performance. Given the finite nature of the pre-determined bonus pool, greater allocation of the bonus pool to one particular employee reduces the amount available to others. This has been described in the literature as *compensation interdependence* and bears relevance for the operation of incentive systems involving both objective and subjective evaluations. In particular, Bol et al. (2015) find that managers are less likely to apply discretionary adjustments when a positive adjustment to one set of employees results in a negative adjustment to others—that is, when there is high compensation interdependence. Examining responses to post-experimental questions, they find that supervisors operating in high-compensation-interdependence conditions were particularly concerned about demotivating workers who would miss out on a reward due to managerial discretion.

In our study, we are less interested in the drivers of managerial use of discretion and more in how the use of discretion relates to understanding subsequent performance. Therefore, we examine the relation between discretionary adjustments and subsequent performance of (a) employees who receive a discretionary bonus or penalty due to subjective evaluations (hereafter,

www.manaraa.com

actual recipients) and (b) employees who fail to receive a bonus or a penalty that they would have otherwise been assigned in absence of managerial discretion (hereafter, *would-be* recipients). The former refers to a *nominal* effect of managerial discretion, in that the targeted employees experience an actual change in their wealth, above and beyond any recurrent fixed pay. This effect has been documented in the literature. In fact, most of the empirical evidence on the relation between the use of managerial discretion and subsequent performance in prior literature relates to the nominal effect of receiving discretionary bonuses (e.g. Hayes and Schaefer 2000; Ederhof 2010). The latter represents an *opportunity* effect of managerial discretion, because, in this case, the employees experience no change in actual wealth (other than receiving the recurrent fixed pay) but any expectation of receiving a reward or penalty they may have formed based on their objective performance fails to materialize due to managerial discretion. To the best of our knowledge, ours is the first study to empirically explore the opportunity effect of managerial discretion.

4.2.2. Use of Managerial Discretion and Subsequent Performance

Several theories motivate directional predictions about the nominal and the opportunity effects of managerial discretion. We group these theories into two groups based on the different assumptions with respect to the mechanism explaining the relation between managerial discretion and subsequent performance. Information-based explanations refer to the notion that managerial discretion captures current information about non-contractible factors that are subsequently reflected in future performance. Motivation-based explanations refer to the notion that the use of managerial discretion may trigger employee reactions affecting subsequent effort, based on how the use of managerial discretion is perceived by the employee.

www.manaraa.com

4.2.2.1. Information-based Explanation

Prior research posits that when objective performance metrics are subject to contracting limitations, the use of managerial discretion can mitigate such imperfections and lead to superior contracting compared to objective measurement alone (Baker et al. 1994; Baiman and Rajan 1995; Ittner et al. 2003; Gibbs et al. 2004; Ederhof 2010). For example, performance-based incentive schemes are limited to the extent that they are only confined to a number of observable performance metrics, while management desires additional employee behaviors (e.g., that are related to worker attitudes, or to employee creativity in solving problems unforeseeable ex-ante, or stewardship behaviors that benefit the organization above and beyond the workers' main responsibilities) that are non-contractible but relate positively to performance. By allowing managers to consider non-contractible aspects of performance (Hayes and Schaefer 2000; Rajan and Reichelstein 2009), managerial discretion can correct for many shortcomings of objective performance measurements. Ederhof (2010) shows empirically that managerial discretion exercised in the payout of bonuses reflects performance assessments based on non-contractible measures. Specifically, she finds that discretionary bonuses paid to CEOs explain future financial performance improvements beyond the explanatory power of current financial performance trends. She concludes that discretionary bonuses are paid to reward non-contractible elements of current performance (i.e., actions and behaviors enacted in the present period) that are then reflected in future financial performance.

Moreover, to the extent that ex-post discretionary adjustments are informed by non-contractible signals representing the workers' *actual* effort, managerial discretion can improve upon objective measures by taking into account exceptional environmental and uncontrollable factors impacting measurable performance. For example, if a machine breakdown or an

www.manaraa.com

unexpected delay in the delivery of a critical component led to a significant drop in production volumes, integrating the objective performance metric with a discretionary adjustment to account for such uncontrollable events would allow to give credit to the workers for their actual effort.[85] Accordingly, the subjective decision to reward (penalize) performance might entail information reflected in the objective performance of subsequent periods, where such uncontrollable events are unlikely to repeat.

In sum, the information-based explanation suggests that the use of managerial discretion is informative about such non-contractible aspects of current agent effort that are likely to be reflected in future performance. If so, actual recipients of a subjective reward (penalty) should exhibit subsequent objective performance improvements (declines). Similarly, would-be recipients of a reward (penalty) should exhibit objective performance declines (improvements).[86]

4.2.2.2. Motivation-based Explanation

Whereas the information-based explanation links managerial discretion and subsequent performance through the informativeness of signals of current effort reflected in future performance, the motivation-based explanation posits that the use of managerial discretion may *affect* future effort through Bayesian revisions of the mapping between effort and payoffs associated with the incentive system (Prendergast and Topel 1993; Ittner et al. 2003; Gibbs et al. 2004; Moers 2005). The direction and magnitude of such changes in effort depend on how employees interpret the use of managerial discretion and influence their motivation to perform in

[85] Bol and Smith (2011) find that managers are more likely to subjectively correct performance results to account for unfavorable events that hindered employees' objective performance than to correct for events that favored employees' performance. In other words, managers are more likely to use subjectivity to account for bad luck than to account for good luck. The cited experimental study, however, did not involve compensation interdependence.
[86] Definitions of actual and would-be recipients were given in the introduction section.

www.manaraa.com

the subsequent period. Research proposes a number of different mechanisms that may influence employees' reactions to the use of managerial discretion.

Credibility. If managerial discretion is used for reasons that are credible in the eyes of the employees (e.g., correcting for unforeseeable events, accounting for current non-contractible aspects of performance, etc.), it could sustain the credibility of the incentive system by portraying an intact link between effort and payoffs (Lawler 1971; Folger and Konovsky 1989; Baker et al. 1994; Gibbs et al. 2004). Perceptions of the incentive system as a fair and trustworthy process should, therefore, lead to greater future effort and, thus, performance, independently from the outcome (i.e., reward or penalty). If management's subjective judgments are, instead, interpreted as bias, then they might communicate a broken link between effort and payoffs and give rise to negative effort adjustments (Prendergast and Topel 1993; Baker et al. 1994; Baker, Jensen, and Murphy 1998; Ittner et al. 2003; Gibbs et al. 2004; Moers 2005). Uncertainty in the relation between effort and payoffs increases the risk associated with effort (even for employees that might have been unduly favored by managerial discretion), thus discouraging incremental effort in the future or leading to decreased levels (Prendergast and Topel 1993; Woods 2012). Therefore, if managerial discretion is interpreted as bias, we expect to see a deterioration of subsequent effort, especially for those employees that experience a negative outcome (actual recipients of penalties and would-be recipients of rewards), while employees experiencing positive outcomes (actual recipients of rewards and would-be recipients of penalties) may maintain their current level of effort, but are unlikely to increase it.

Self-serving Bias. Social psychology theory predicts that employees will interpret positive and negative outcomes differently. In particular, research shows that people are prone to self-serving bias, whereby they attribute positive outcomes to their own abilities and negative ones to

www.manaraa.com

external factors outside of their control (Heider 1958; Miller and Ross 1975; Bradley and Greenwald 1978). These studies suggest that employees would trust an incentive system *selectively* depending on whether the outcome they experience is positive or negative. That is, actual recipients of subjective rewards and would-be recipients of penalties may interpret the discretionary adjustment as an intact link between pay and actual effort and should exhibit increased subsequent effort as a testament of a trustworthy incentive system. Conversely, actual recipients of penalties and would-be recipients of rewards may attribute the unfavorable outcome to a biased incentive system and to procedural injustice, which would result in subsequent performance declines.

Reciprocity. Objective performance metrics signal a worker's effort to managers and fellow workers alike. While the signal might be imperfect, it contributes to a worker's expectations with respect to performance-related payoffs (in our study, rewards or penalties). Koszegi and Rabin (2006), posit that individuals interpret any favorable or unfavorable deviations from their rational outcome expectations as gains or losses. To the extent that workers experience subjectively determined rewards (penalties) as deviations from rational expectations based on objective metrics, they are likely to interpret management's discretion as favorable (unfavorable) treatment. Reciprocity theory predicts that workers receiving favorable treatment will respond with greater-than-expected effort, while those subject to unfavorable treatment will respond with undesired behaviors, ranging from lower-than-expected effort to retaliation that may damage profitability (Fehr and Schmidt 1995; Falk and Fischbacher 2006; Krueger and Mas 2009). Managerial discretion resulting in deviations from expected payoffs should then lead to positive employee reactions (more effort and better performance) to subjectively assigned rewards and

www.manaraa.com

negative reactions to subjectively assigned penalties, as workers attempt to rebalance the economic exchange with their organization (Akerlof 1984; Falk and Fischbacher 2006).

Differently from the literature on the information effect of managerial discretion, the aforementioned studies do not point toward a consistent expectation with respect to the relation between managerial discretion and future employee performance. The hypothesized directional predictions based on the theories discussed in this section are summarized in Figure 4.1.

Figure 4.1
Summary of Theoretical Predictions for the Relation between Managerial Discretion and Subsequent Performance

		Information-based Explanation	Motivation-based Explanations		
			Credibility (Yes/No)	Self-serving Bias	Reciprocity
Nominal Effect	Actual Recipient of Reward (*Subjective Reward*)	+	+/?	+	+
	Actual Recipient of Penalty (*Subjective Penalty*)	-	+/-	-	-
Opportunity Effect	Would-be Recipient of Penalty (*Opportunity Gain*)	+	+/?	+	+
	Would-be Recipient of Reward (*Opportunity Loss*)	-	+/-	-	-

4.3. Research Setting

We obtained data from a Chinese manufacturing firm that uses monetary rewards and penalties to incentivize performance in its 11 departments.[87] At the end of each month, the members of the department with the highest performance receive a bonus (hereafter: reward),

[87] We acknowledge that the cited theories refer to individual behavior, whereas our unit of analysis is a department. While, in our setting, we cannot control for intra-group dynamics, we follow Abernethy et al. (2019) and assume that the performance observed at the department level represents the average individual response to the use of managerial discretion in the allocation of performance-related payoffs.

www.manaraa.com

while the members of the worst-performing department are penalized with a pay deduction (hereafter: penalty).[88] Department operational performance is evaluated based on a scorecard that aggregates multiple objective metrics. Management, however, has the option to integrate subjective performance assessments into their reward and penalty allocation decisions. Interviews with company executives reveal that their subjective considerations generally include assessments of employee attitude and morale. However, there are no company guidelines for these considerations and the rationale behind them is not disclosed ex-ante. Employees know that the allocation of rewards and penalties depends on the combination of objective performance and subjective assessments. Monetary rewards and penalties are fixed equivalent amounts—about 12% of the average monthly salary. For the most part, department teams are fixed across months and each team continues to perform the same activities throughout our sample period.

At the beginning of each fiscal year, top corporate executives set quantifiable monthly targets and weights for every dimension of objective performance included in the scorecard for all departments.[89] Departments participate actively in the target-setting process; final targets reflect consensus between management and workers in terms of congruence with strategic goals, appropriateness, and level of difficulty across all departments. Based on the annual targets, goals are set for each of the 12 months and are not renegotiated until the next annual target-setting cycle. Department goals take into consideration their different activities, interdependencies, and contribution to the firm's overall performance. While monthly goals are department-specific, the

[88] While, in the vast majority of cases, one department per month received the reward and one received the penalty, in four instances during our sample period, rewards were assigned to both the department ranked first based on objective evaluation and subjectively to another department and, in five instances, penalties were assigned to both the department ranked last based on objective evaluations and subjectively to another department. In 5 out of the 25 months, we did not observe any monetary reward at all, while monetary penalties were assigned in every month in our sample period. Our main inferences are not affected by these cases.

[89] Each department is assigned multiple monthly financial and nonfinancial goals, as well as goals for process improvement and human resources development.

www.manaraa.com

negotiation process ensures that they are all equally attainable. Departments then receive monthly scores based on their achievements relative to assigned goals. Departments meeting target expectations on every performance dimension earn 100 points and can score even more points by exceeding their targets. Monetary rewards and penalties are assigned at the end of each month. There is no performance carry-over; each month's evaluation concerns only that month's results.

As in most firms, department operational performance is publicly disclosed within the organization through a monthly performance scorecard. Since management also discloses which departments were rewarded and penalized each month, their use of subjective evaluations is visible to all employees and effectively equates to management overriding objective rankings. Monthly town hall meetings,[90] during which site performance is presented and discussed interactively, allow employees to inquire about the criteria used in the determination of the most recent rewards and penalties.

4.4. Methodology

4.4.1. Research Design

Our research setting allows us to obtain empirical measures of the nominal and opportunity effects because management discretion, when applied, results in observable discrepancies between the actual recipients of the reward and penalty and the distribution of objective performance accomplishments. Figure 4.2 illustrates our empirical proxies for the nominal and opportunity effects of managerial discretion, using a hypothetical example with six departments. The left column represents the objective rankings. If, as described in the right column, managerial discretion results in a reward for the second-ranked department and a penalty for the fifth-ranked

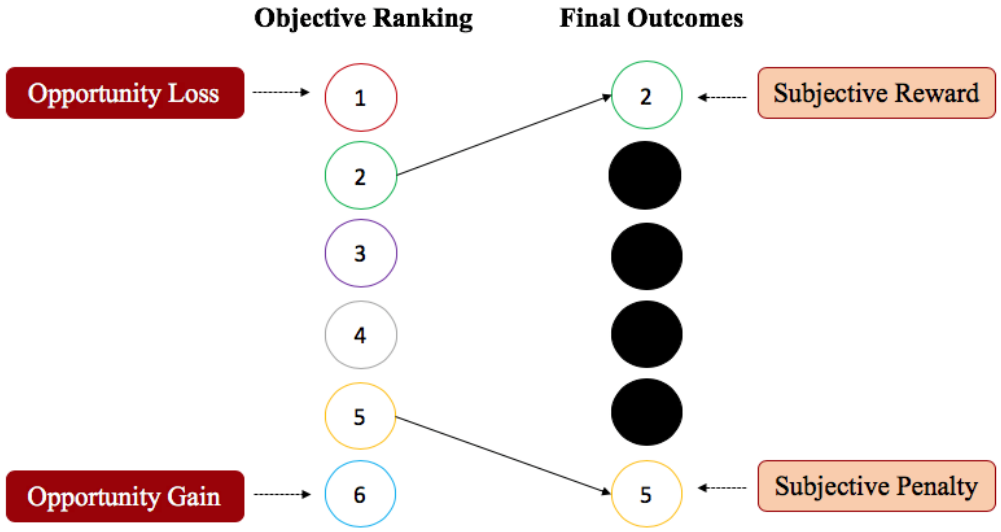
[90] A town hall meeting in these settings refers to a site-wide meeting involving all employees.

www.manaraa.com

department (i.e., the *actual* recipients of the reward and penalty), then the first- and last-ranked departments (i.e., the *would-be* recipients of the reward and penalty) experience an opportunity loss and an opportunity gain, respectively.

Figure 4.2
Empirical Measures for Nominal and Opportunity Effect

Figure 4.2 illustrates how using discretionary ex-post overrides of objective performance results to assign rewards and penalties gives rise to *opportunity gains* and *losses*. The figure represents a hypothetical sample of 6 departments. We posit that managers use discretionary adjustments to assign the monetary reward (penalty) to department 2 (5). Department 1 (6), which scored higher (lower) based on objective performance evaluations, experiences the subjective assignment as an opportunity loss (gain).



To examine the *nominal* effect of subjectivity, we study the subsequent performance of the *actual* recipients. To examine the *opportunity* effect of subjectivity, we examine the subsequent performance of the *would-be* recipients.[91] We estimate the following equation:

$$\Delta PerfScore_{i,t} = \alpha + \beta_1 SubjRew_{i,(t-1)} + \beta_2 SubjPen_{i,(t-1)} + \beta_3 OppGain_{i,(t-1)} + \beta_4 OppLoss_{i,(t-1)}$$
$$+\beta_5 Busy\ Month_t + \beta_6 NEmpl_{i,t} + \beta_7 FPct_{i,t} + \beta_8 AgeLess30_{i,t} + \beta_9 \Delta PerfScore_{i,(t-1)}$$

[91] Our empirical tests further distinguish between actual recipients of rewards and of penalties. We refer to the distinct cases with respect to the nominal effect as subjective rewards (Department 2 in Figure 4.2) and subjective penalties (Department 5 in Figure 4.2), respectively. Similarly, we distinguish between would-be recipients of rewards and penalties. We refer to the distinct cases with respect to the opportunity effect as opportunity losses (Department 1 in Figure 4.2) and opportunity gains (Department 6 in Figure 4.2), respectively.

www.manaraa.com

$$+\varepsilon \quad (1)$$

where the dependent variable $\Delta PerfScore_{i,t}$ captures the change in objective performance between months *(t-1)* and *t*.[92] Nominal effects of managerial discretion are captured by coefficients β_1, associated with $SubjRew_{i,(t-1)}$—an indicator variable equal to 1 if department *i* in month *(t-1)* was an actual recipient of a subjective reward, and 0 otherwise—and β_2, associated with $SubjPen_{i,(t-1)}$—an indicator variable equal to 1 if department *i* in month *(t-1)* was an actual recipient of a subjective penalty, and 0 otherwise. Opportunity effects of managerial discretion are captured by coefficients β_3, associated with $OppGain_{i,(t-1)}$—an indicator variable equal to 1 if department *i* in month *(t-1)* was a would-be recipient of a penalty, and 0 otherwise—and β_4, associated with $OppLoss_{i,(t-1)}$—an indicator variable equal to 1 if department *i* in month *(t-1)* was a would-be recipient of a reward, and 0 otherwise.

Our control variables include $BusyMonth_t$, an indicator variable equal to 1 if month *t* is considered a month of high production, and 0 otherwise;[93] $NEmpl_{i,t}$, the number of employees in department *i* in month *t*; $FPct_{i,t}$, the percentage of women in department *i* in month *t*; $AgeLess30_{i,t}$, the percentage of employees younger than 30 in department *i* in month *t*. We also control for possible preexisting performance trends by including the lagged change in performance observed in the previous month ($\Delta PerfScore_{(t-1)}$). All our variables are defined in Appendix G.

4.4.2. Data

Our sample includes 25 monthly observations spanning three consecutive fiscal years for each of the firm's 11 departments. Table 4.1 reports the descriptive statistics. Our main dependent

[92] We focus on predicting *changes* because we are interested in estimating performance *reactions*. A levels analysis would not be appropriate for this type of inference.
[93] The factory experiences seasonal demand volume, with peaks concentrated in specific months.

www.manaraa.com

variable is the change in performance score ($\Delta PerfScore_{i,t}$), which is slightly negative on average (μ = -0.612) and exhibits significant variation (σ = 16.103). Although achieving all targets awards a department 100 points, departments can exceed expectations and earn scores greater than 100.[94] During our sample period, the average department received a reward (penalty) 2.182 (2.727) times. About half of the rewards and penalties in our sample period were assigned subjectively.

Table 4.1
Descriptive Statistics

Variable	N	Mean	Std. dev.	Min	p25	p50	p75	Max
PerfScore	275	63.479	17.001	23.000	52.000	65.000	75.000	107.000
ΔPerfScore	264	-0.612	16.103	-62.000	-9.500	0.500	9.250	45.000
Reward	275	0.087	0.283	0.000	0.000	0.000	0.000	1.000
Penalty	275	0.109	0.312	0.000	0.000	0.000	0.000	1.000
SubjRew	275	0.044	0.205	0.000	0.000	0.000	0.000	1.000
SubjPen	275	0.047	0.213	0.000	0.000	0.000	0.000	1.000
OppGain	275	0.029	0.168	0.000	0.000	0.000	0.000	1.000
OppLoss	275	0.047	0.213	0.000	0.000	0.000	0.000	1.000
BusyMonth	275	0.480	0.501	0.000	0.000	0.000	1.000	1.000
NEmpl	275	16.255	14.944	2.000	7.000	10.000	18.000	68.000
Fpct	275	0.412	0.274	0.034	0.200	0.333	0.667	1.000
AgeLess30	275	0.377	0.235	0.000	0.222	0.340	0.500	1.000

Table 4.2 reports pairwise correlation coefficients for our main variables. Departments with a greater percentage of women appear to perform worse (ρ = -0.154, $p < 0.05$) and are more likely to be penalized (ρ = 0.149, $p < 0.05$). Departments with a younger employee base (*AgeLess30*) also exhibit lower performance (ρ = -0.142, $p < 0.05$), but are more likely to avoid being penalized when ranking at the bottom of objective rankings (ρ = 0.157, $p < 0.01$). This is probably due to managers considering the inexperience of younger workers when evaluating their performance.

[94] Objective performance measures in our setting are therefore not subject to ceiling effects.

www.manaraa.com

Table 4.2
Correlation Matrix

This table reports the Pearson correlation coefficients among all of our variables of interest for the estimation of our statistical models. Two-tail statistical significance of the correlation coefficients is indicated as follows: * = (p<0.10), ** = (p<0.05), *** = (p<0.01).

	1	*2*	*3*	*4*	*5*	*6*
1. PerfScore	1.0000					
2. Reward	0.3432***	1.0000				
3. Penalty	-0.4127***	-0.1082*	1.0000			
4. SubjRew	0.1392**	0.6908***	-0.0747	1.0000		
5. SubjPen	-0.1436**	-0.0689	0.6366***	-0.0476	1.0000	
6. OppGain	-0.3020***	-0.0535	-0.0606	-0.0370	-0.0386	1.0000
7. OppLoss	0.3198***	-0.0689	-0.0779	-0.0476	-0.0496	-0.0386
8. BusyMonth	0.0303	-0.0392	0.0374	-0.0271	-0.0082	-0.0797
9. NEmpl	-0.0306	-0.0847	-0.0560	-0.0550	0.0284	-0.0131
10. Fpct	-0.1537**	-0.0508	0.1485**	-0.0893	0.0725	0.0776
11. AgeLess30	-0.1423**	-0.0020	0.0920	0.0136	0.0080	0.1569***

	7	*8*	*9*	*10*	*11*
7. OppLoss	1.0000				
8. BusyMonth	0.0261	1.0000			
9. NEmpl	-0.0406	-0.0208	1.0000		
10. Fpct	-0.0435	-0.0131	-0.0307	1.0000	
11. AgeLess30	-0.0633	-0.0329	-0.2613***	0.1866***	1.0000

4.4.3. Empirical Results

Table 4.3 reports the results of our estimation of Equation (1) using heteroscedasticity-robust OLS. To account for idiosyncratic department-level characteristics, we included department fixed effects. To account for correlation in the behaviors of departments over time, we clustered standard errors by department.[95] Column (1) reports the results of estimating Equation (1) limited to the nominal effects. We find that the objective performance of actual recipients of subjective rewards exhibits significant improvement in the following month (β_1= 15.851, p<0.01), while the objective performance of actual recipients of subjective penalties declines (β_2= -11.301, p<0.01).

[95] Panel data analyses often raise concerns about incidental parameter problems, which could bias the estimation of statistical models using OLS. The incidental parameter problem is typical of panels with large *n* and small *t* (respectively, a large number of subjects and a small number of periods). In our case, however, *t* is more than double *n*, thus rendering the concern about the incidental parameter problem negligible (Nickell 1981).

www.manaraa.com

Column (2) reports the results of estimating Equation (1) limited to the opportunity effects. Opportunity gains are associated with performance improvements in the subsequent month (β_3= 11.466, p<0.05), while opportunity losses are associated with performance declines (β_4= -12.750, p<0.05). The estimation of the full specification of Equation (1), reported in Column (3), shows performance effects similar to those estimated in columns (1) and (2). We conclude that managerial discretion in the determination of performance-related payoffs is indeed associated with future performance. Our results pertaining to the nominal effect of managerial discretion are consistent with prior literature documenting a positive relation between subjective allocation of performance related payoffs and subsequent performance. We add to this literature by providing empirical evidence supporting our prediction that, in the presence of high compensation interdependence, this relation extends to the opportunity effect of managerial discretion, in that we observe a significant, theory-consistent performance effect associated with workers for whom managerial discretion results in gains or losses that are defined only in opportunity terms.[96]

[96] All our results are robust to the influence of outliers. Repeating all our tests winsorizing the dependent variables at the 1st and 99th, 5th and 95th, and 10th and 90th percentiles in each month, the results (untabulated) are consistent with those reported in this manuscript.

www.manaraa.com

Table 4.3
Nominal and Opportunity Performance Effects of Managerial Discretion

Table 4.3 reports the coefficients estimated for Eq. (1). Estimations are performed using OLS with heteroscedasticity-robust standard errors. For each coefficient, we report t-statistics in parentheses. The dependent variable, $\Delta PerfScore$, is calculated as $PerfScore_{(t)} - PerfScore_{(t-1)}$. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = (p<0.10), ** = (p<0.05), *** = (p<0.01). The bottom row reports the results of Wald tests, with which we analyze the statistical significance between the indicated coefficients. The null hypothesis is that the difference between the absolute value of the coefficients is not statistically different from zero. A p-value (reported in brackets) below 0.10 (0.05) [0.01] would allow us to reject the null with confidence at the 90% (95%) [99%] level, two-tailed.

		(1) *ΔPerfScore*	(2) *ΔPerfScore*	(3) *ΔPerfScore*
$SubjRew_{i,(t-1)}$	b_1	15.851***		15.136***
		(3.80)		(3.44)
$SubjPen_{i,(t-1)}$	b_2	-11.301***		-10.780***
		(-4.61)		(-4.55)
$OppGain_{i,(t-1)}$	b_3		11.466**	10.846***
			(3.17)	(3.39)
$OppLoss_{i,(t-1)}$	b_4		-12.750**	-11.643**
			(-3.01)	(-2.64)
$BusyMonth_t$		3.687	4.073	3.733
		(1.43)	(1.74)	(1.50)
$NEmpl_t$		0.155	0.117	0.148
		(1.07)	(0.57)	(0.86)
$Fpct_t$		16.672	4.157	11.967
		(1.31)	(0.37)	(1.18)
$AgeLess30_{i,t}$		3.673	3.450	3.066
		(0.55)	(0.64)	(0.53)
$\Delta PerfScore_{i,(t-1)}$		-0.348***	-0.279***	-0.307***
		(-7.18)	(-4.39)	(-5.31)
Intercept		-13.295**	-7.165	-10.785**
		(-3.08)	(-1.44)	(-2.57)
N		253	253	253
Adj. R-squared		0.160	0.134	0.188
Department fixed effects		Yes	Yes	Yes
Clustering		Department	Department	Department
Test if $\lvert b_1\rvert=\lvert b_4\rvert$				0.23
				(0.641)
Test if $\lvert b_2\rvert=\lvert b_3\rvert$				0.00
				(0.989)

www.manaraa.com

4.4.4. Information- and Motivation-based Explanations

The empirical results of the analyses of our field data are consistent with theoretical predictions related to the information-based explanation, but also with some of the motivation-based explanations (i.e., self-serving bias and reciprocity). Therefore, our main results are not sufficient to determine whether the observed relation represents a manifestation of managerial discretion accounting for non-contractible signals that are then reflected in future performance or if there is also an actual change in effort (motivation effect) driven by workers' Bayesian revisions of the mapping between effort and payoffs.

In order to further explore possible reasons for our findings, we perform two additional tests. First, we examine whether the nominal and opportunity effects differ in their persistence. Recall that the information-based explanation of managerial discretion rests on the assumption that non-contractible elements of performance taken into account to determine the allocation of the reward or penalty are then reflected in subsequent performance. That is, managers' discretionary adjustments operate as a correction of inadequacies of objective performance metrics to capture actual employee effort. As such, managerial discretion should correct the relation between effort and payoff for actual and would-be recipients simultaneously.[97] We augment the specification of Equation (1) with lagged values of subjective rewards/penalties and opportunity gains/losses and report the estimated coefficients in Table 4.4. Our results show that performance changes associated with the nominal effect of a reward (penalty) subjectively assigned in month *t* reverse or disappear in month (*t+2*), whereas those associated with the opportunity effect persist.[98]

[97] In our setting, we cannot determine with certainty if a reward (penalty) was subjectively assigned to a department ranking lower (higher) than the top (bottom) spot to reward (punish) the actual recipient or to punish (reward) the would-be recipient.

[98] Perusal of our data does not indicate serial correlation between receiving awards (penalties) at the department level. In addition, no department received a discretionary reward or penalty for two months in a row.

www.manaraa.com

Because of the opportunity effect being the "other side of the coin" of the nominal effect of managerial discretion (that is, one decision by managers gives rise to both effects), it seems improbable that managers systematically capture non-contractible elements of performance that are reflected in longer future periods when associated with the opportunity effect compared to when they are associated with the nominal effect. Therefore, we infer that the asymmetry in persistence indicates that the information effect alone is not sufficient to explain the observed changes in performance subsequent to the use of managerial discretion.

www.manaraa.com

Table 4.4
Persistence of the Nominal and Opportunity Effects

Table 4.4 reports the coefficients estimated for Eq. (1) augmented with the inclusion of lagged variables for both the nominal effect (subjective rewards and penalties) and the opportunity effect (opportunity gains and losses) of managerial discretion. Estimations are performed using OLS with heteroscedasticity-robust standard errors. For each coefficient, we report t-statistics in parentheses. The dependent variable, *ΔPerfScore*, is calculated as $PerfScore_{(t)} - PerfScore_{(t-1)}$. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = (p<0.10), ** = (p<0.05), *** = (p<0.01).

		(1) *ΔPerfScore*	(2) *ΔPerfScore*	(3) *ΔPerfScore*
$SubjRew_{i,(t-1)}$	b_1	15.909***		15.698***
		(3.85)		(3.36)
$SubjRew_{i,(t-2)}$	b_2	-9.651***		-4.738
		(-3.34)		(-1.10)
$SubjPen_{i,(t-1)}$	b_3	-10.232***		-8.630***
		(-4.28)		(-3.79)
$SubjPen_{i,(t-2)}$	b_4	8.741**		8.027**
		(2.63)		(2.96)
$OppGain_{i,(t-1)}$	b_5		11.135**	9.415**
			(2.88)	(3.05)
$OppGain_{i,(t-2)}$	b_6		15.714**	16.233**
			(2.30)	(2.23)
$OppLoss_{i,(t-1)}$	b_7		-11.180**	-7.515
			(-2.38)	(-1.18)
$OppLoss_{i,(t-2)}$	b_8		-9.542**	-8.352*
			(-2.29)	(-2.01)
BusyMonth		3.810	3.854	3.613
		(1.55)	(1.67)	(1.48)
NEmpl		0.136	0.138	0.168
		(0.80)	(0.61)	(0.90)
FPct		9.780	2.603	5.567
		(0.73)	(0.25)	(0.53)
$AgeLess30_{i,t}$		4.941	1.452	1.964
		(0.83)	(0.26)	(0.34)
$\Delta PerfScore_{i,(t-1)}$		-0.305***	-0.337***	-0.338***
		(-5.48)	(-4.71)	(-5.03)
Intercept		-10.706**	-6.123	-8.593*
		(-2.36)	(-1.17)	(-1.88)
N		253	253	253
Adj. R-squared		0.181	0.169	0.228
Department fixed effects		Yes	Yes	Yes
Clustering		Department	Department	Department

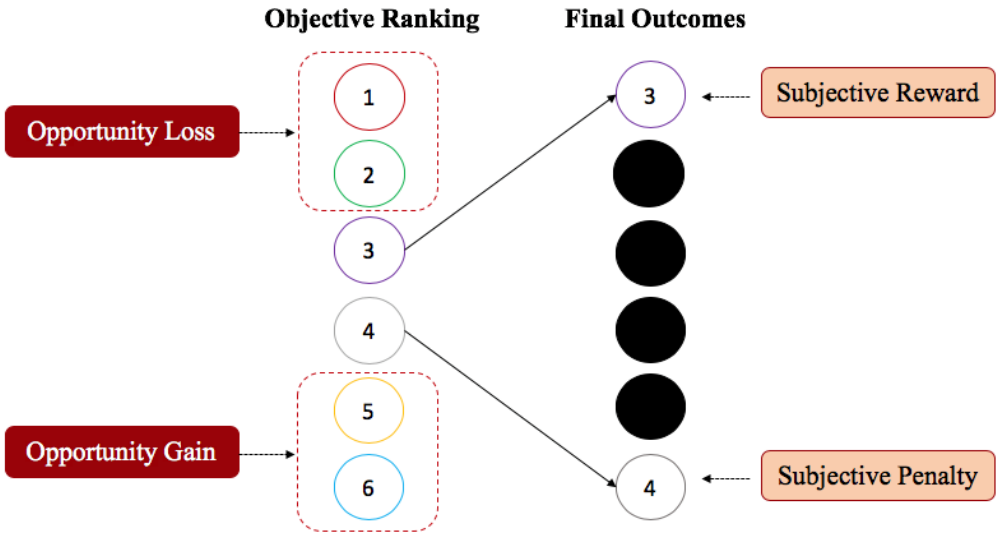
Second, we examine the intensity of the opportunity effect by adopting a broader definition of would-be recipients. Whereas, in our research setting, subjective performance evaluations

www.manaraa.com

generally give rise to a single actual recipient of a reward or penalty, *any* department that ranked higher (lower) than the actual recipient of the reward (penalty) in the objective rankings can be classified as a would-be recipient. This expanded definition is graphically illustrated in Figure 4.3, which relates to the previously discussed hypothetical example of a company with six departments. If managerial discretion results in a subjective reward (penalty) for department 3 (4), then departments 1 and 2 (5 and 6) may both experience an opportunity loss (gain) because each of them scored higher (lower) objective performance compared to the actual recipient.

Figure 4.3
Expanded Definitions of Opportunity Gains and Losses

Figure 4.3 proposes a situation similar to that in Figure 4.2 (hypothetical sample of 6 departments), but using an extended definition of opportunity gains and losses, wherein we posit that *any* department scoring higher (lower) than the ultimate recipient of the actual reward (penalty) in month *t* experiences an opportunity loss (gain). The difference between this definition and the one described in Figure 4.2 is that the more restrictive definition considers only the top (bottom) performer's response to the discretionary ex-post adjustment, whereas the expanded definition includes *all* departments that were ranked above (below) the department receiving the actual reward (penalty).



If subsequent performance were to be explained uniquely by the information effect, we should observe performance effects associated with the opportunity effect even with the expanded definition. To examine this possibility, we estimate Equation (1) replacing *OppGain* and *OppLoss*

www.manaraa.com

with indicator variables capturing the expanded definition. The variable $OppGainExp_{i,(t-1)}$ ($OppLossExp_{i,(t-1)}$) is equal to 1 if department *i* is ranked below (above) the department receiving the actual penalty (reward), and 0 otherwise. The estimation reported in Column 1 of Table 4.5 focuses on the expanded opportunity effects alone, while in Column (2) we also control for the nominal effects of subjectivity. In both estimations, the performance effect associated with the expanded definition of opportunity gain is positive and significant (β_1= 11.710, p<0.01, in the more conservative estimation), in line with our main results. In contrast, the performance effect associated with the expanded definition of opportunity loss is not significant. We infer that while an opportunity gain has broad influence for all the workers who were spared from a penalty, an opportunity loss seems to matter only to those who scored the highest objective performance but failed to receive the reward. These asymmetries are incompatible with the information-based explanation being the sole driver of the relation between managerial discretion and subsequent performance.

www.manaraa.com

Table 4.5
Expanded Measure of Opportunity Gains and Losses

Table 4.5 reports the results of the estimation of Eq. (1). However, in this model we use the expanded definition of opportunity gains (losses) as described in Figure 4.3. This expanded definition allows us to consider the reaction of *any* department that scored greater (lower) performance with respect to the objective metrics than the actual recipient of the reward (penalty) did. With this expanded definition, we analyze whether subsequent performance reactions are driven by having scored better (worse) than the recipient of the reward (penalty) independent of being ranked first (last) based on objective performance metrics. Estimations are performed using OLS with heteroscedasticity-robust standard errors. For each coefficient we reported t-statistics in parentheses. The dependent variable, $\Delta PerfScore$, is calculated as $PerfScore_{(t)} - PerfScore_{(t-1)}$. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = (p<0.10), ** = (p<0.05), *** = (p<0.01).

	(1)	(2)
	ΔPerfScore	*ΔPerfScore*
$OppGainExp_{i,(t-1)}$	12.055***	11.710***
	(4.06)	(4.32)
$OppLossExp_{i,(t-1)}$	-1.997	-1.331
	(-1.13)	(-0.76)
$SubjRew_{i,(t-1)}$		14.950***
		(3.48)
$SubjPen_{i,(t-1)}$		-9.487***
		(-4.34)
$BusyMonth_t$	4.055	3.735
	(1.71)	(1.47)
$NEmpl_t$	-0.023	-0.007
	(-1.11)	(-0.28)
$FPct_t$	0.497	2.566
	(0.29)	(1.49)
$AgeLess30_{i,t}$	-1.082	-1.337
	(-0.91)	(-1.14)
$\Delta PerfScore_{i,(t-1)}$	-0.275***	-0.300***
	(-4.74)	(-5.76)
Intercept	-2.048	-3.320***
	(-1.59)	(-3.78)
N	253	253
Adj. R-squared	0.118	0.168
Department fixed effects	YES	YES
Clustering	Department	Department

4.5. Alternative Explanations

4.5.1. Predictable Determinants of Managerial Discretion

In this section, we explore potential determinants of the use of discretionary adjustments to assign rewards and penalties in our field setting. Because in this study we adopt the perspective

www.manaraa.com

of the employee, examining the determinants of managerial discretion is relevant only to the extent that, if these factors were to predict the allocation of discretionary rewards and penalties in a way that is uncorrelated with department performance, workers might incorporate such patterns into their rational expectations. For example, managers could use discretionary adjustments to correct for performance effects stemming from targets that were set too high or too low for a particular department as a way to *unofficially* rebalance the relation between actual effort and the aggressiveness of the targets. Additionally, management could be consciously or unconsciously biased toward certain groups based on their individual characteristics, such as gender or age, or based on their particular function in the operations.

To examine whether management's discretionary selection of recipients is influenced by any of these factors, we examine the likelihood of subjective assignments of rewards and penalties based on department characteristics and on particular times in the year when management might be more or less likely than usual to assign subjective rewards or penalties to sustain workers' motivation. In our setting, monthly targets are set annually and are not renegotiated during the year. Moreover, it may require several months before it becomes evident whether targets are too aggressive or too easy. Therefore, in earlier months of the performance cycle, management would be less inclined to use discretionary adjustments of objective performance to assign rewards and penalties to unofficially revise targets. Instead, should an annual target result to be too aggressive (easy), management would be more likely to use discretion to rebalance the relation between actual effort and payoff toward the end of the year by becoming more lenient (demanding). We use the following model specification to test whether any of these explanations may lead workers to predict the use of managerial discretion:

$$SubjOutcome_{i,t} = \alpha + \beta_1 StartYear_t + \beta_2 EndYear_t + \beta_3 NEmpl_{i,t} + \beta_4 FPct_{i,t} + \beta_5 AgeLess30_{i,t} + \beta_6 BusyMonth_{i,t} + \varepsilon. \quad (2)$$

www.manaraa.com

In Equation (2), the dependent variable $SubjOutcome_{i,t}$ is replaced by either $SubjRew_{i,t}$ or $SubjPen_{i,t}$. $StartYear_t$ is an indicator variable equal to 1 if month t is one of the first two months of the year and $EndYear_t$ is an indicator variable equal to 1 if month t is one of the last two months of the year. All other variables are as previously defined. We estimate the model using logistic regression, including department fixed effects and clustering errors at the department level. The results, reported in Table 4.6, indicate no evidence of subjective rewards (penalties) being given during times in the planning cycle when management's target readjustment efforts would be more evident. Among the department characteristics, we find that departments with a higher percentage of women are more likely to be penalized even when they are not ranked last, consistent with the correlation coefficient reported in Table 4.2.

www.manaraa.com

Table 4.6
Test of Alternative Explanations: Determinants of Use of Managerial Discretion

Table 4.6 reports the results of the estimation of Eq. (2). Estimations are performed using logit with heteroscedasticity-robust standard errors. For each coefficient, we report t-statistics in parentheses. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = (p<0.10), ** = (p<0.05), *** = (p<0.01).

	(A) *SubjPen*	(B) *SubjRew*
StartYear	0.473	0.789
	(0.37)	(1.00)
EndYear	0.610	-0.405
	(0.49)	(-0.32)
NEmpl	-0.102	-0.126
	(-1.20)	(-0.62)
FPct	16.125**	-1.042
	(2.17)	(-0.19)
AgeLess30	3.507	1.249
	(0.92)	(0.29)
BusyMonth	0.191	0.290
	(0.16)	(0.51)
Intercept	-9.968	-1.998
	(-1.61)	(-0.71)
N	200	200
Pseudo R-squared	0.136	0.050
Department fixed effects	YES	YES

4.5.2. Favoritism in Managerial Discretion

Another concern associated with our setting is that a particular department might be consistently favored (unfavored) by management. Reasons might include undue influence on management by department team members, perhaps through personal connections or political affiliations. We analyzed the sequence of assignments of subjective rewards and penalties and found no cases of departments receiving a discretionary reward (penalty) twice in a row.

4.5.3. Alternative Explanation of Nominal Effects: Reward (Penalty) Effects

www.manaraa.com

The changes in performance we documented in association with the allocation of a subjective reward (penalty) might be due to a wealth effect associated with the reward (penalty) itself, independent of whether the allocation was ultimately determined by management's discretion or by objective rankings. Therefore, we compare changes in performance associated with actual recipients of rewards (penalties) with those associated with departments that received rewards (penalties) in the absence of any discretionary adjustments. We estimate the following equation:

$$\Delta PerfScore_{i,t} = \alpha + \beta_1 Reward_{i,(t-1)} + \beta_2 Reward_{i,(t-1)} * SubjRew_{i,(t-1)} + \beta_3 Penalty_{i,(t-1)} + \beta_4 Penalty_{i,(t-1)} * SubjPen_{i,(t-1)} + \beta_5 BusyMonth_t + \beta_6 NEmpl_{i,t} + \beta_7 FPct_{i,t} + \beta_8 AgeLess30_{i,t} + \beta_9 \Delta PerfScore_{i,(t-1)} + \varepsilon, \quad (3)$$

where $Reward_{i,(t-1)}$ is an indicator variable equal to 1 if department *i* received a reward (without the use of discretion) in month *(t-1)*, and 0 otherwise; $Penalty_{i,(t-1)}$ is an indicator variable equal to 1 if department *i* received a penalty (without the use of discretion) in month *(t-1)*, and 0 otherwise. In this specification, the interpretation of the coefficient associated with *Reward* (*Penalty*) is the effect on subsequent performance of receiving a reward (penalty) based on objective rankings alone, while the coefficient associated with the interaction term is the incremental effect of subjectivity in determining the reward (penalty).[99]

As summarized in Table 4.7, the coefficients associated with subjective rewards and penalties continue to be consistent with our main results and we find no significant objective performance effects associated with receiving a reward (penalty) in the absence of managerial discretion. Taken together, our results suggest that the nominal effect of managerial discretion

[99] In this specification, we represent the event of a subjective reward (penalty) as the interaction between the assignment of a reward (penalty) and the fact that it originated from management's discretion. While the interaction term is equivalent to the variable *SubjRew* (*SubjPen*), we specify our variables in this way to highlight the interpretation of the interaction term as the *incremental* effect of receiving a reward (penalty) as a result of subjective evaluations, as opposed to simply receiving a reward (penalty) based on objective performance.

www.manaraa.com

hinges on the process used by management to determine the recipients of rewards and penalties and not simply on the changes in wealth caused by the bonuses or pay cuts.

Table 4.7
Test of Alternative Explanations: Reward (Penalty) Effects

Table 4.7 reports the results of the estimation of Eq. (3). Estimations are performed using OLS with heteroscedasticity-robust standard errors. For each coefficient, we report t-statistics in parentheses. The dependent variable, *ΔPerfScore*, is calculated as $PerfScore_{(t)} - PerfScore_{(t-1)}$. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = (p<0.10), ** = (p<0.05), *** = (p<0.01).

	ΔPerfScore
$Reward_{i,(t-1)}$	-7.967
	(-1.29)
$Reward*SubjRew_{i,(t-1)}$	23.216**
	(2.52)
$Penalty_{i,(t-1)}$	-0.396
	(-0.18)
$Penalty*SubjPen_{i,(t-1)}$	-11.036***
	(-4.57)
$BusyMonth_t$	3.720
	(1.45)
$NEmpl_{i,t}$	0.147
	(0.98)
$FPct_{i,t}$	17.740
	(1.35)
$AgeLess30_{i,t}$	3.368
	(0.51)
$\Delta PerfScore_{i,(t-1)}$	-0.331***
	(-9.11)
Intercept	-13.110**
	(-3.10)
N	253
Adj. R-squared	0.162
Department fixed effects	Yes
Clustering	Department

4.5.4. Alternative Explanation of Opportunity Effects: Rank-first and Rank-last Effects

An alternative explanation for the opportunity effects of managerial discretion documented above might simply be the propensity to improve (diminish) performance after being ranked last (first) and might therefore be independent of not getting a reward or a penalty due to management

www.manaraa.com

discretion. Changes in performance associated with being ranked first or last might derive from regression to the mean. Top-ranked (bottom-ranked) performance might be unlikely to persist for a long time due to fluctuations in favorable (unfavorable) stochastic events influencing objective performance. Additionally, reactions to *relative* performance information may explain a reversal of performance for top- and bottom-ranked departments. For example, top-ranked workers might become overconfident and reduce effort due to complacency (Casas-Arce and Martinez-Jerez 2009), while being ranked at the bottom might trigger social comparison mechanisms (Fredrickson 1992), which in turn might lead to performance improvements to preserve reputation. Bottom ranking might also represent salient information for the workers about the likelihood of receiving a penalty in the future if their performance does not improve. To test whether this might be the case, we estimate the following model:

$$\Delta PerfScore_{i,t} = \alpha + \beta_1 RankLast_{i,(t-1)} + \beta_2 RankLast_{i,(t-1)} * OppGain_{i,(t-1)} + \beta_3 RankFirst_{i,(t-1)} + \beta_4 RankFirst_{i,(t-1)} * OppLoss_{i,(t-1)} + \beta_5 BusyMonth_t + \beta_6 NEmpl_{i,t} + \beta_7 FPct_{i,t} + \beta_8 AgeLess30_{i,t} + \beta_9 \Delta PerfScore_{i,(t-1)} + \varepsilon \,. \quad (4)$$

Estimation results are reported in Table 4.8. $RankLast_{i,(t-1)}$ ($RankFirst_{i,(t-1)}$) is defined as an indicator variable equal to 1 if department *i* is ranked last (first) based on objective performance in month *t*, and 0 otherwise. In estimating Equation (4), we compare subsequent performance across departments that ranked last (first) and did not get a penalty (reward) and departments that were ranked last (first) and did. The coefficients associated with the interaction terms represent the incremental effect of not getting a reward (penalty) while ranking first (last).[100] When we examine the opportunity effect of subjective penalties (opportunity gain), controlling for being ranked last, we continue to find a significant incremental effect on subsequent performance (β_2=10.426,

[100] As in our previous test of reward (penalty) effects, we specify our model in a way that highlights the incremental effect of not getting a reward (penalty) while ranking first (last). The interaction term is equivalent to the variable *OppLoss* (*OppGain*).

www.manaraa.com

p<0.01), which confirms our prior conclusions about the opportunity effect of managerial discretion on workers' subsequent performance. However, when we control for being ranked first, we find no additional effect of opportunity loss on subsequent performance. While we cannot conclusively rule out this alternative explanation for the performance effects of opportunity loss, our results further support our findings with respect to opportunity gain.

Table 4.8
Test of Alternative Explanations: Rank-first and Rank-last Effects

Table 4.8 reports the results of the estimation of Eq. (4). Estimations are performed using OLS with heteroscedasticity-robust standard errors. For each coefficient, we report t-statistics in parentheses. The dependent variable, *ΔPerfScore*, is calculated as $PerfScore_{(t)} - PerfScore_{(t-1)}$. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = (p<0.10), ** = (p<0.05), *** = (p<0.01).

	ΔPerfScore
$RankLast_{i,(t-1)}$	1.084
	(0.32)
$RankLast*OppGain_{i,(t-1)}$	10.426***
	(4.59)
$RankFirst_{i,(t-1)}$	-10.479
	(-1.50)
$RankFirst*OppLoss_{i,(t-1)}$	-3.249
	(-0.47)
$BusyMonth_t$	4.085
	(1.78)
$NEmpl_{i,t}$	0.106
	(0.49)
$FPct_{i,t}$	4.093
	(0.33)
$AgeLess30_{i,t}$	3.629
	(0.64)
$\Delta PerfScore_{i,(t-1)}$	-0.252***
	(-4.53)
Intercept	-6.586
	(-1.21)
N	253
Adj. R-squared	0.143
Department fixed effects	Yes
Clustering	Department

www.manaraa.com

4.6. Additional Test: Experimental Evidence of Motivation Effects

Our main tests support our conjecture that the informativeness-based explanation is not sufficient to explain the entirety of the relation between the use of managerial discretion and subsequent employee performance. We acknowledge that, in our field setting, we cannot disentangle the different motivation-based explanations described in Section 4.2.2.2. Therefore, we conduct an additional randomized controlled experiment to explicitly test for the motivation effect of managerial discretion. In the experiment, we directly ask participants about their willingness to exert *effort* instead of examining their future period performance, thus ruling out the information-based explanation by construction. While we could not run this inquiry in our field setting, the purpose of our analysis is to provide empirical evidence of motivation-based explanations in a controlled environment, which could contribute to explain our field-based results.

We recruited 505 participants using Amazon's Mechanical Turk (M-Turk). Each was presented with a brief description of the purpose of the experiment and asked to sign an informed consent.[101] All who opted to participate read the same description of an incentive system mirroring the one in our research setting. Participants would assume the role of a member of a team whose performance was evaluated based on a combination of objective and subjective factors. Members of the best-performing (worst-performing) team would receive a monetary award (penalty) equal to 10% of their monthly salary. Next, participants learned about their team's objective performance and relative performance rankings in a certain month and whether management had decided to give them a reward (penalty) after considering their objective performance and subjective assessments. Participants were randomly assigned to one of 10 conditions representing the

[101] See Appendix H for details about the experiment materials.

www.manaraa.com

following scenarios: (a) objective rewards (penalties);[102] (b) subjective rewards (penalties) for workers ranking second (second to last); (c) subjective rewards (penalties) for workers ranking far from the top (bottom); (d) not receiving a reward (penalty) while ranking at the top (bottom); and (e) not receiving a reward (penalty) while ranking far from the top (bottom). Participants were then asked to indicate how much more or less effort they would be willing to apply to their work in the subsequent month using a seven-point scale ranging from -3 ("a lot less") to +3 ("a lot more"), where the midpoint 0 represented the status quo ("same effort"). They could also add free-text comments motivating their choice.[103] Lastly, they were asked a number of post-experiment questions to collect demographic information. Participants were rewarded for their time in accordance with Amazon M-Turk guidelines.[104]

We estimate the following equation:

$$\Delta Effort_{i,t} = \alpha + \beta_1 SubjRew_{i,(t-1)} + \beta_2 SubjPen_{i,(t-1)} + \beta_3 OppGain_{i,(t-1)} + \beta_4 OppLoss_{i,(t-1)} + \beta_5 Female_i + \beta_6 Age_i + \beta_7 Manager_i + \varepsilon, \quad (5)$$

where $\Delta Effort$ is the individual participant's response indicated in the experiment; *Female* is an indicator variable equal to 1 if the participant identified as a female and 0 otherwise; *Age* is the participant's age in years, and *Manager* is an indicator variable equal to 1 if the participant declared himself or herself to have had managerial experience.[105] Our variables of interest (*SubjRew*, *SubjPen*, *OppRew*, and *OppPen*) are defined consistently with the variables used in our main tests.

Table 4.9, Panel A, reports the results of our OLS estimation of Equation (5). We find significant performance effects associated with actual and would-be recipients of subjective

[102] We refer to instances of rewards and penalties assigned without subjective adjustments – i.e. cases when workers ranked at the top (bottom) based on objective performance receive the reward (penalty) – as objective rewards (penalties).
[103] Appendix I shows a sample of those responses.
[104] The average duration of the experiment was 3 minutes and 57 seconds. Each participant was paid $0.50.
[105] We control for managerial experience in order to take into account the differences between our pool of experimental subjects and the workers included in our field sample, who are mostly line workers with no managerial responsibilities.

www.manaraa.com

rewards. These experimental findings provide evidence in support of motivation effects explaining the observed relation between managerial discretion and subsequent performance. In particular, we find that receiving a subjective reward or a subjective penalty leads to greater effort in the subsequent month; that opportunity losses drive negative subsequent performance; and that opportunity gains have no significant effect on participants' effort choices.[106]

To reconcile our results with individual motivation theories described earlier (see Section 4.2.2.2), we explore potential moderators that might shed light on the observed dynamics. We leverage on the free-text justifications to glean insights into participants' interpretations of managerial discretion. We define an indicator variable *NegInt* that is equal to 1 if the participants communicated distrust in the incentive system or interpreted the system as biased, and zero otherwise.[107] We then perform a cross-sectional analysis of changes in effort based on the positive versus negative interpretations by estimating the following equation:

$$\Delta Effort_{i,t} = \alpha + \beta_1 SubjRew_{i,(t-1)} + \beta_2 SubjPen_{i,(t-1)} + \beta_3 OppGain_{i,(t-1)} + \beta_4 OppLoss_{i,(t-1)} + \beta_5 SubjRew_{i,(t-1)} * NegInt_i + \beta_6 SubPen_{i,(t-1)} * NegInt_i + \beta_7 OppGain_{i,(t-1)} * NegInt_i + \beta_8 OppLoss_{i,(t-1)} * NegInt_i + \beta_9 Female_i + \beta_{10} Age_i + \beta_{11} Manager_i + \varepsilon \quad (6)$$

The results are reported in Table 4.9, Panel B, and show that the coefficients estimated for the interaction terms are negative and significant, which suggests that applying managerial discretion drives unfavorable nominal and opportunity motivation effects when participants interpret the incentive system as biased.[108] These results hold irrespective of whether participants

[106] Adopting the expanded definition of subjective rewards and penalties yields results similar to those in Table 4.9.
[107] The coding of the indicator variable was based on the consensus of the members of the research team with respect to the content of the text-based responses. Missing responses and responses that could not be interpreted as a manifestation of the participant's opinion of the incentive system were coded as missing values. Examples for negative and non-negative interpretations based on the text-based responses are provided in Appendix I.
[108] The coefficient associated with each interaction term in Equation (6) provides a direct estimation of the difference in effort change between participants with negative versus non-negative interpretations pertaining to each of the four distinct cases. In an alternative model specification that would additionally include the main effect of *NegInt*, the coefficient on the interaction term would estimate a difference-in-differences for the effect of using managerial discretion (versus not) and the effect of interpreting the incentive system negatively (versus not). With that specification, we would need to use post-estimation tests (i.e. Wald tests) to validate the significance of the difference

www.manaraa.com

gain or lose due to the discretionary adjustments. In sum, we find evidence of nominal and opportunity effects consistent with the theoretical prediction associated with incentive credibility as articulated in Section 4.2.2.1 and summarized in Figure 4.1.

Table 4.9
Test of Motivation Effects: Experimental Evidence

Table 4.9, Panel A, reports the results of the estimation of Eq. (5). Panel B reports the estimation results of Eq. (6). The sample includes cross-sectional observations of a sample of 505 participants in our experiment. Estimations are performed using OLS. For each coefficient, we report t-statistics in parentheses. Two-tail statistical significance indicated by: * = (p<0.10), ** = (p<0.05), *** = (p<0.01).

Panel A: Combined Effects

	(1) *ΔEffort*	(2) *ΔEffort*	(3) *ΔEffort*
$SubjRew_{i,(t-1)}$	0.421***		0.360**
	(2.64)		(2.14)
$SubjPen_{i,(t-1)}$	0.437***		0.376**
	(2.80)		(2.28)
$OppGain_{i,(t-1)}$		0.034	0.219
		(0.17)	(1.05)
$OppLoss_{i,(t-1)}$		-0.767***	-0.582***
		(-3.81)	(-2.75)
$Female_i$	0.327***	0.311**	0.308**
	(2.68)	(2.55)	(2.54)
Age_i	-0.009	-0.009	-0.009
	(-1.54)	(-1.62)	(-1.52)
$Manager_i$	0.016	0.034	0.026
	(0.13)	(0.28)	(0.21)
Intercept	1.370***	1.629***	1.428***
	(6.19)	(7.49)	(6.24)
N	505	505	505
Adj. R-squared	0.031	0.037	0.047

between negative and non-negative interpretations of the applied discretionary adjustments. For ease of interpretation, we chose to report the estimation results of Equation (6), but our results are robust to using the alternative model specification.

www.manaraa.com

Panel B: Cross-sectional Variation Based on Interpretation of Managerial Discretion

	(1) *ΔEffort*	(2) *ΔEffort*	(3) *ΔEffort*
$SubjRew_{i,(t-1)}$	0.483***		0.426**
	(3.15)		(2.77)
$SubjPen_{i,(t-1)}$	0.892***		0.838***
	(5.58)		(5.25)
$OppGain_{i,(t-1)}$		0.366	0.557
		(1.79)	(2.78)
$OppLoss_{i,(t-1)}$		-0.228	-0.034
		(-1.02)	(-0.16)
$SubjRew_{i,(t-1)}*NegInt_i$	-1.468**		-1.462**
	(-2.22)		(-2.34)
$SubjPen_{i,(t-1)}*NegInt_i$	-2.455***		-2.468***
	(-7.44)		(-7.91)
$OppGain_{i,(t-1)}*NegInt_i$		-2.225***	-2.230***
		(-4.43)	(-4.75)
$OppLoss_{i,(t-1)}*NegInt_i$		-2.005***	-2.028***
		(-4.87)	(-5.28)
$Female_i$	0.329***	0.280**	0.278**
	(2.84)	(2.38)	(2.53)
Age_i	-0.006	-0.007	-0.003
	(-1.08)	(-1.27)	(-0.65)
$Manager_i$	0.021	0.000	0.046
	(0.18)	(0.00)	(0.41)
Intercept	1.279***	1.578***	1.283***
	(6.10)	(7.54)	(6.20)
N	505	505	505
Adj. R-squared	0.133	0.111	0.225

Our experimental results show that motivation effects contribute to influencing the performance of employees that experience managerial discretion, and the direction of these effects depends on the worker's interpretation of managers' motivations to use their discretion in determining performance-based payoffs. The direct applicability of our experimental results to the field setting is subject to important limitations. A key difference between the employees in our field setting and the participants in our experiment relates to *how* their judgement for the credibility of the use of managerial discretion is formed. Whereas employees in our field setting base their judgment on potential unobservable factors arising in the work environment, experimental

www.manaraa.com

participants can only rely on observable performance metrics to evaluate the use of managerial discretion as fair/unfair. Additionally, perceptions about the use of managerial discretion are shaped dynamically over a longer period of time—an institutional feature that we could not reproduce in the lab. Nevertheless, we believe that our experimental evidence sheds light on one potential mechanism that might interact with the information-based explanation of the relation between managerial discretion and subsequent performance. We encourage future research to address this phenomenon in greater depth.

4.7. Conclusions

This study explores the relation between discretionary adjustments of objective performance evaluations and subsequent employee performance in a setting with high compensation interdependence, and in which the incentive system involves both rewards and penalties. In such settings, using subjectivity to assign monetary payoffs to some workers mechanically impacts other workers, who miss out on a reward or are spared from a penalty as a result of management's discretion. We predict and find that the use of subjectivity to determine performance-related payoffs in the presence of high compensation interdependence gives rise to a *nominal* performance effect (associated with workers who receive the reward (penalty) subjectively—the *actual* recipients) and an *opportunity* performance effect (associated with workers who fail to receive the reward (penalty) due to management's discretion—the *would-be* recipients). We then analyze the mechanisms that might explain the documented relation.

We use field data from a Chinese manufacturing company that operates an incentive system whereby monthly monetary rewards and penalties are allocated to the best- and worst-performing of 11 departments in a particular production site. We show that the use of managerial discretion to assign performance-related monetary rewards and penalties is associated with changes in

www.manaraa.com

subsequent performance. Specifically, we document that workers experiencing managerial discretion either through the *nominal* effect or the *opportunity* effect exhibit similar performance changes. That is, both actual rewards (penalties) and opportunity gains (losses) are associated with higher (lower) objective performance in the following month. To the best of our knowledge, we believe that our study is the first to show empirically that managerial discretion impacts not only those workers who are *directly* affected by managerial discretion (that is, those who *receive* a subjective reward or penalty) but also those who are *indirectly* affected by the subjective decision via opportunity effects (that is, workers who *fail to receive* a reward or a penalty as a result of managerial discretion).

We further explore different explanations for our empirical results. Prior research posits that the use of managerial discretion is an informative signal of non-contractible aspects that are related to future performance. This view suggests that the observed empirical relation is explained by the exercise of managerial discretion in the current period to reward effort that will then materialize into future performance. This view, however, exhibits important limitations with respect to the following two factors documented in the literature with respect to the use of managerial discretion. First, empirical research finds that managers apply discretion in evaluating subordinates' performance less frequently than theory would predict (Höppe and Moers 2011; Woods 2012; Bol et al. 2015). Proposed explanations include low trust between the supervisor and the employee, which can impair the effectiveness of subjective evaluations by confounding them with bias (Gibbs et al. 2004); the possible impact of subjective adjustments on multiple employees simultaneously (Bol et al. 2015); and the possibility that managerial discretion might *affect* future performance (Moers 2005; Bol et al. 2015; Abernethy et al. 2019). To the extent that subjective payoffs are based on non-contractible performance factors observable by both the principal and

www.manaraa.com

the agent (Hayes and Schaefer 2000; Rajan and Reichelstein 2009; Ederhof 2010), they should not be subject to interpretation or to concerns about bias. Second, managers' consideration that their discretion in evaluating current employee performance might *impact* future performance (and not simply *predict* the effect of current actions) is in line with behavioral theories stating that the use of managerial discretion may cause employees to correct their beliefs with respect to the mapping between effort and payoff and *change* the level of effort they are willing to provide in the future (motivation effect). The direction of that change depends on how they interpret the exercised discretionary adjustments. Therefore, we explore the possibility that the relation between managerial discretion and future performance might be explained by a combination of information-based explanations and motivation-based explanations. A battery of additional tests provide evidence in line with this prediction.

Whereas our research site is ideal to explore our phenomenon of interest, our work is subject to some limitations common to field-based research. In particular, since our study is based on a single Chinese manufacturing organization, the generalizability of our results to other industries and cultures is limited. Additionally, our findings—especially those relative to opportunity gains and losses—depend on workers having sufficient information on their objective performance to detect the application of discretionary adjustments to the compensation outcomes. Nonetheless, we stress that most companies in most industries document objective performance via scorecards and KPI dashboards that are widely disseminated within the organization. Additionally, many firms allow managers to include subjective evaluations in the assessments of their subordinates and disclose the identity of recipients of rewards and penalties within the organization (e.g., engraved plaques, "employee-of-the-month" posters, etc.). Our specific advantage in this study arises from the possibility to detect and measure empirically the application

www.manaraa.com

of managerial discretion in our field setting. Finally, difficulties to capture workers' perceptions of the incentive system in place in our field setting preclude us from examining cross-sectional variations that could shed light on the specific behavioral mechanisms underlying the observed changes in performance associated with managerial discretion.

Despite these limitations, our study contributes to the literature on subjectivity in incentive contracting by providing empirical evidence of performance effects associated with the use of managerial discretion that were only theorized in prior research. We are the first to document empirically that managerial discretion indeed generates both nominal and opportunity performance effects, the latter of which had only be theorized in prior research. Our results provide important insights to the practitioner community by highlighting how subjective performance evaluations impact subjects who are not the immediate target of managers' discretionary decisions and how that may significantly influence an incentive system's overall effectiveness. We encourage future research to further explore underlying mechanisms for the nominal and opportunity effects of managerial discretion.

www.manaraa.com

BIBLIOGRAPHY

Abernethy, M. A., C.-Y. Hung, and L. van Lent. 2019. Expertise and discretionary bonus decisions. *Management Science* (forthcoming).

Abernethy, M.A., Dekker, H.C. and Schulz, A.K.D., 2015. Are employee selection and incentive contracts complements or substitutes? Journal of Accounting Research, 53(4), pp. 633-668.

Akerlof, G. A. 1984. Gift exchange and efficiency-wage theory: Four views. *The American Economic Review* 74 (2):79-83.

Akerlof, G.A. and Kranton, R.E., 2000. Economics and identity. The Quarterly Journal of Economics, 115(3), pp. 715-753.

Akerlof, G.A. and Kranton, R.E., 2005. Identity and the economics of organizations. The Journal of Economic Perspectives, 19(1), pp. 9-32.

Amabile, T. M. 1988. A model of creativity and innovation in organizations. *Research in Organizational Behavior* 10: 123-167.

Amabile, T. M. 1993. Motivational synergy: Toward new conceptualizations of intrinsic and extrinsic motivation in the workplace. *Human Resources Management Review* 3 (3): 185-201.

Babin, B.J. and Boles, J.S., 1996. The effects of perceived co-worker involvement and supervisor support on service provider role stress, performance and job satisfaction. Journal of Retailing, 72(1), pp. 57-75.

Baiman, S., and M. V. Rajan. 1995. The informational advantage of discretionary bonus schemes. *The Accounting Review* 70 (4):557-579.

Baker, G. P., M. C. Jensen, and K. J. Murphy. 1988. Compensation and incentives: Practice vs. theory. *Journal of Finance* 43 (3):593-616.

Baker, G. P., R. Gibbons, and K. J. Murphy. 1994. Subjective performance measures in optimal incentive contracts. *The Quarterly Journal of Economics* 109 (4):1125-1156.

Baker, G., Gibbons, R. and Murphy, K.J., 2002. Relational contracts and the theory of the firm. The Quarterly Journal of Economics, 117(1), pp. 39-84.

Banker, R.D., Lee, S.Y., Potter, G. and Srinivasan, D., 1996. Contextual analysis of performance impacts of outcome-based incentive compensation. Academy of Management Journal, 39(4), pp. 920-948.

Banker, R.D., Potter, G. and Srinivasan, D., 2000. An empirical investigation of an incentive plan that includes nonfinancial performance measures. The Accounting Review, 75(1), pp. 65-92.

www.manaraa.com

Baranchuk, N., R. Kieschnick, and R. Moussawi. 2014. Motivating innovation in newly public firms. *Journal of Financial Economics* 111 (3): 578-588.

Baumann, O., and N. Stieglitz. 2014. Rewarding value-creating ideas in organizations: The power of low-powered incentives. *Strategic Management Journal* 35 (3): 358-375.

Birkinshaw, J., and L. Duke. 2013. Employee-led innovation. *Business Strategy Review* 24:46-51.

Bloom, N. and Van Reenen, J., 2007. Measuring and explaining management practices across firms and countries. The Quarterly Journal of Economics, 122(4), pp. 1351-1408.

Bol, J. and Loftus, S., 2018. The dual-role framework for effective management control systems: Activating and directing employee effort. Working paper, Tulane University.

Bol, J. C. 2007. Subjectivity in compensation contracting. *Journal of Accounting Literature* 27:1-24.

Bol, J. C., and S. D. Smith. 2011. Spillover effects in subjective performance evaluation: Bias and the asymmetric influence of controllability. *The Accounting Review* 86 (4):1213-1230.

Bol, J. C., G. Hecht, and S. D. Smith. 2015. Managers' discretionary adjustments: The influence of uncontrollable events and compensation interdependence. *Contemporary Accounting Research* 32 (1):139-159.

Bolton, P., Scheinkman, J., and Xiong, W. 2006. Executive Compensation and Short-Termistic Behaviour in Speculative Markets. *Review of Economic Studies* 73(3), 577-610.

Bradley, G., and Greenwald, Anthony G. 1978. Self-serving biases in the attribution process: A reexamination of the fact or fiction question. *Journal of Personality and Social Psychology*, 36(1): 56-71.

Brief, A., and S. Motowidlo. 1986. Prosocial organizational behaviors. *Academy of Management Review*, 11, 710-725.

Brueggen, A., C. Feichter, and M. Williamson. 2017. The effect of input and output targets for routine tasks on creative task performance. *The Accounting Review* 93 (1): 29-43.

Burgess S., and M. Ratto. 2003. The Role of Incentives in the Public Sector: Issues and Evidence, Oxford Review of Economic Policy, 19 (2): 285–300

Bushman, R.M., Davidson, R.H., Dey, A. and Smith, A., 2018. Bank CEO materialism: Risk controls, culture and tail risk. Journal of Accounting and Economics, 65(1), pp. 191-220.

Campbell, D. 2008. Nonfinancial performance measures and promotion-based incentives. *Journal of Accounting Research* 46 (2):297-332.

www.manaraa.com

Campbell, D. and Sandino, T., 2019. Sustaining corporate culture in a growing organization. Harvard Business School Teaching Note No. 9-119-109.

Campbell, D., 2012. Employee selection as a control system. Journal of Accounting Research, 50(4), pp. 931-966.

Cardinal, L.B., Sitkin, S.B. and Long, C.P., 2004. Balancing and rebalancing in the creation and evolution of organizational control. Organization Science, 15(4), pp. 411-431.

Cartwright, S. and Cooper, C.L., 1996. Managing mergers acquisitions and strategic alliances. London and New York: Routledge.

Casas-Arce, P., and F. A. Martinez-Jerez. 2009. Relative performance compensation, contests, and dynamic incentives. *Management Science* 55 (8):1306-1320.

Chatman, J.A., 1989. Matching people and organizations: Selection and socialization in public accounting firms. In Academy of Management Proceedings (Vol. 1989, No. 1, pp. 199-203). Briarcliff Manor, NY: Academy of Management.

Chen, X., Q. Cheng, A. Lo., and X. Wang. 2015. CEO contractual protection and managerial short-termism. *The Accounting Review*, 90 (5): 1871-1906.

Cheng, S. 2004. R&D expenditures and CEO compensation. *The Accounting Review* 79 (2): 305-328.

Coletti, A.L., Sedatole, K.L. and Towry, K.L., 2005. The effect of control systems on trust and cooperation in collaborative environments. The Accounting Review, 80(2), pp. 477-500.

Davidson, R., Dey, A. and Smith, A., 2015. Executives' "off-the-job" behavior, corporate culture, and financial reporting risk. Journal of Financial Economics, 117(1), pp. 5-28.

Davis, James H, F. D. Schoorman, and L. Donaldson, 1997. Toward a stewardship theory of management, *Academy of Management Review*, 22 (1): 20-47

Deller, C. and Sandino, T., 2018. Who should select new employees in geographically dispersed organizations: Headquarters or the unit manager? Consequences of centralizing hiring at a retail chain. Harvard Business School Accounting and Management Unit Working Paper 16-088.

Deller, C., 2017. Beyond performance: When potential matters to employee career outcomes. Unpublished working paper, The Wharton School of the University of Pennsylvania.

Deller, C., S. Gallani, and T. Sandino. 2018. In search of organizational alignment using a 360-degree assessment system: A field experiment in a retail chain. *Harvard Business School Working Paper* No. 18-069.

www.manaraa.com

Drake, A., S.F. Haka, and S.P. Ravenscroft. 1999. Cost system and incentive structure effects on innovation, efficiency and profitability in teams. *The Accounting Review*, 74(3): 323-345.

Ederer, F. 2013. Incentives for parallel innovation. In SSRN: https://ssrn.com/abstract=2309664 or http://dx.doi.org/10.2139/ssrn.2309664.

Ederer, F., and G. Manso. 2013. Is Pay for Performance Detrimental to Innovation? *Management Science* 59 (7): 1496-1513.

Ederhof, M. 2010. Discretion in bonus plans. *The Accounting Review* 85 (6):1921-1949.

Edmondson, A., 1999. Psychological safety and learning behavior in work teams. Administrative Science Quarterly, 44(2), pp. 350-383.

Eisenberger, R., Stinglhamber, F., Vandenberghe, C., Sucharski, I.L. and Rhoades, L., 2002. Perceived supervisor support: Contributions to perceived organizational support and employee retention. Journal of Applied Psychology, 87(3), p.565-573.

Eisenhardt, K.M., 1985. Control: Organizational and economic approaches. Management Science, 31(2), pp. 134-149.

Falk, A., and U. Fischbacher. 2006. A theory of reciprocity. *Games and Economic Behavior* 54 (2):293-315.

Fehr, E., and K. M. Schmidt. 1995. The economics of fairness, reciprocity and altruism—Experimental evidence and new theories. In *Handbook of the economics of giving, altruiusm, and reciprocity* 1: 615-691.

Fisher, R.J., 1993. Social desirability bias and the validity of indirect questioning. Journal of Consumer Research, 20(2), pp. 303-315.

Folger, R., and M. A. Konovsky. 1989. Effects of procedural and distributive justice on reactions to pay raise decisions. *Academy of Management Journal* 32 (March): 115-130.

Fredrickson, J. R. 1992. Relative performance information: The effects of common uncertainty and contract type on agent effort. *The Accounting Review* 67 (4):647-669.

Freiberg, K. and Freiberg, J., 1998. Nuts! Southwest airlines' crazy recipe for business and personal success. New York: Crown Business.

George, J. M., and A. P. Brief. 1992. Feeling good-doing good: a conceptual analysis of the mood at work-organizational spontaneity relationship. *Psychological Bulletin* 112 (2): 310-329.

Gibbons, R. and Henderson, R., 2012. Relational contracts and organizational capabilities. Organization Science, 23(5), pp. 1350-1364.

www.manaraa.com

Gibbons, R. and Henderson, R., 2013. What do managers do? Exploring persistent performance differences among seemingly similar enterprises. The Handbook of Organizational Economics Princeton University Press

Gibbons, R. and Kaplan, R.S., 2015. Formal measures in informal management: Can a balanced scorecard change a culture? American Economic Review, 105(5), pp. 447-51.

Gibbs, M., K. A. Merchant, W. A. Van der Stede, and M. E. Vargus. 2004. Determinants and effects of subjectivity incentives. *The Accounting Review* 79 (2):409-436.

Grabner, I. 2014. Incentive system design in creativity-dependent firms. *The Accounting Review* 89 (5): 1729-1750.

Grabner, I. and Moers, F., 2013. Managers' choices of performance measures in promotion decisions: An analysis of alternative job assignments. Journal of Accounting Research, 51(5), pp. 1187-1220.

Graham, J.R., Harvey, C.R., Popadak, J. and Rajgopal, S., 2017. Corporate culture: Evidence from the field. National Bureau of Economic Research No. w23255.

Guiso, L., Sapienza, P. and Zingales, L., 2006. Does culture affect economic outcomes? Journal of Economic Perspectives, 20(2), pp. 23-48.

Guiso, L., Sapienza, P. and Zingales, L., 2015a. Corporate culture, societal culture, and institutions. American Economic Review, 105(5), pp. 336-39.

Guiso, L., Sapienza, P. and Zingales, L., 2015b. The value of corporate culture. Journal of Financial Economics, 117(1), pp. 60-76.

Hayes, R. M., and S. Schaefer. 2000. Implicit contracts and the explanatory power of top executives compensation for future performance. *The RAND Journal of Economics* 31 (2):273-293.

Heider, F. 1958. *The psychology of interpersonal relations*, New York: Wiley.

Hellmann, T., and V. Thiele. 2011. Incentives and innovation: A multitasking approach. *American Economic Journal: Microeconomics* 3 (1): 78-128.

Hermalin, B.E., 2000. Economics and corporate culture. Available at SSRN: http://ssrn.com/abstract=162549.

Hoffman, M., Kahn, L.B. and Li, D., 2018. Discretion in hiring. The Quarterly Journal of Economics, 133(2), pp. 765-800.

Holmstrom, B. 1989. Agency costs and innovation. *Journal of Economic Behavior and Organization* 12: 305-327.

www.manaraa.com

Holmstrom, B., and P. Milgrom. 1991. Multitask principal-agent analyses: incentive contracts, asset ownership, and job design. *Journal of Law Economics & Organization* 7: 24-52.

Holthausen, R. W., D. F. Larcker, and R. G. Sloan. 1995. Business unit innovation and the structure of executive compensation. *Journal of Accounting and Economics* 19: 279-313.

Höppe, F., and F. Moers. 2011. The choice of different types of aubjectivity in CEO annual bonus contracts. *The Accounting Review* 86 (6):2023-2046.

Ittner, C. D., D. F. Larcker, and M. W. Meyer. 2003. Subjectivity and the Weighting of Performance Measures: Evidence from a Balanced Scorecard. *The Accounting Review* 78 (3):725-758.

Jensen, M.C. and Meckling, W.H., 1995. Specific and general knowledge, and organizational structure. Journal of Applied Corporate Finance, 8(2), pp. 4-18.

Kachelmeier, S. J., and M. G. Williamson. 2010. Attracting creativity: The initial and aggregate effects of contract selection on creativity-weighted productivity. *The Accounting Review* 85 (5): 1669-1691.

Kachelmeier, S. J., B. E. Reichert, and M. G. Williamson. 2008. Measuring and motivating quantity, creativity, or both. *Journal of Accounting Research* 46 (2): 341-373.

Kachelmeier, S., L. Wang, and Williamson, M. 2019. Incentivizing the Creative Process: From Initial Quantity to Eventual Creativity. *The Accounting Review*, 94(2), 249-266.

Kanfer, R., and P. Ackerman. 1989. Motivation and cognitive abilities: An integrative/aptitude-treatment interaction approach to skill acquisition. *Journal of Applied Psychology*, 74, 657-690.

Katz, D. 1964. The motivational basis of organizational behavior. *Behavioral Science* 9 (2):131-146.

Koszegi, B., and M. Rabin. 2006. A model of reference-dependent preferences. *Quarterly Journal of Economics* 121 (4):1133-1166.

Kothari, S.P., S. Shu, and P.D. Wysocki. 2009. Do managers withhold bad news? *Journal of Accounting Research*, 47 (1): 241-276

Kreps, D.M., 1990. Corporate culture and economic theory. Perspectives on Positive Political Economy. Cambridge: Cambridge University Press, 1990, pp. 90-142

Krueger, A. B., and A. Mas. 2009. Strikes, scabs, and tread separations: Labor strife and the production of defective Bridgestone/Firestone tires. *Journal of Political Economy* 112 (2):253-289.

www.manaraa.com

Larkin, I., L. Pierce, and F. Gino. 2012. The psychological costs of pay-for-performance: Implications for the strategic compensation of employees. *Strategic Management Journal*, 33(10), 1194-1214.

Larsson, R. and Finkelstein, S., 1999. Integrating strategic, organizational, and human resource perspectives on mergers and acquisitions: A case survey of synergy realization. Organization Science, 10(1), pp. 1-26.

Lawler, E. E. 1971. *Pay and Organizational Effectiveness*. New York, NY: McGraw-Hill.

Lerner, J., and J. Wulf. 2007. Innovation and incentives: Evidence from corporate R&D. *Review of Economics and Statistics* 89 (4): 634-644.

Li, X. 2016. *Management control and employee-driven innovation*. Doctoral Dissertation, Accounting and Management Unit, Harvard University, Harvard Business School.

Liu, N.Y., Liu, S.Z. and Chu, H.L., 2018. Estimating the effect of a fit-focused employee selection program. Journal of Management Accounting Research, 31(2), pp. 159-175.

Maas, V.S., Van Rinsum, M. and Towry, K.L., 2012. In search of informed discretion: An experimental investigation of fairness and trust reciprocity. The Accounting Review, 87(2), pp. 617-644.

Manso, G. 2011. Motivating innovation. *The Journal of Finance* 66 (5): 1823-1860.

Merchant, K.A. and Van der Stede, W.A., 2007. Management control systems: Performance measurement, evaluation and incentives. Pearson Education.

Miller, Dale T., and M. Ross. 1975. Self-serving biases in the attribution of causality: Fact or fiction? *Psychological Bulletin* 82 (2): 213.

Moers, F. 2005. Discretion and bias in performance evaluation: The impact of diversity and subjectivity. *Accounting, Organizations and Society* 30 (1):67-80.

Nickell, S. 1981. Biases in dynamic models with fixed effects. *Econometrica* 49 (6):1417-1426.

North, D.C., 1991. Institutions. Journal of Economic Perspectives, 5(1), pp. 97-112.

Olea, J. L. M., and C. Pflueger. 2013. A robust test for weak instruments. *Journal of Business and Economic Statistics* 31 (3): 358-369.

O'Reilly III, C.A., Chatman, J. and Caldwell, D.F., 1991. People and organizational culture: A profile comparison approach to assessing person-organization fit. Academy of Management Journal, 34(3), pp. 487-516.

Organ, D. 1988. *Organizational citizenship behavior: The good soldier syndrome*. Lexington, MA: Lexington Books.

www.manaraa.com

Ouchi, W.G., 1979. A conceptual framework for the design of organizational control mechanisms. Management Science, 25(9), pp. 833-848.

Pazy, A. and Ganzach, Y., 2009. Pay contingency and the effects of perceived organizational and supervisor support on performance and commitment. Journal of Management, 35(4), pp. 1007-1025.

Prendergast, C., 2007. The motivation and bias of bureaucrats. American Economic Review, 97(1), pp. 180-196.

Prendergast, C., 2009. Contracts and conflict in organizations. Unpublished manuscript, Graduate School of Business, University of Chicago.

Prendergast, C., and R. Topel. 1993. Discretion and bias in performance evaluation. *European Economic Review* 37 (2-3):355-365.

Rajan, M. V., and S. Reichelstein. 2009. Objective versus Subjective Indicators of Managerial Performance. *The Accounting Review* 84 (1):209-237.

Resick, C.J., Baltes, B.B. and Shantz, C.W., 2007. Person-organization fit and work-related attitudes and decisions: Examining interactive effects with job fit and conscientiousness. Journal of Applied Psychology, 92(5), pp. 1446-1455.

Rhoades, L. and Eisenberger, R., 2002. Perceived organizational support: A review of the literature. Journal of Applied Psychology, 87(4), pp. 698-714.

Rivera, L.A., 2012. Hiring as cultural matching: The case of elite professional service firms. American Sociological Review, 77(6), pp. 999-1022.

Schein, E.H., 1985. Organizational culture and leadership. San Francisco: Jossey-Bass.

Segal, L., and Mark Lehrer. 2012. The institutionalization of stewardship: theory, propositions, and insights from change in the Edmonton Public Schools, *Organization Studies*, 33(2) 169-201

Shanock, L.R. and Eisenberger, R., 2006. When supervisors feel supported: Relationships with subordinates' perceived supervisor support, perceived organizational support, and performance. Journal of Applied Psychology, 91(3), pp. 689-695.

Simons, R., 1994. Levers of control: How managers use innovative control systems to drive strategic renewal. Harvard Business Press.

Simons, R., 2000. Performance measurement and control systems for implementing strategy. Prentice Hall.

Simons, R., 2005. Levers of organization design: How managers use accountability systems for greater performance and commitment. Harvard Business Press.

www.manaraa.com

Simons, R., 2010. Seven strategy questions: A simple approach for better execution. Harvard Business Press.

Stoltzfus G, B. L. Nibbelink, D. Vredenburg, and E. Thyrum. 2011. Gender, Gender Role, and Creativity. *Social Behavior & Personality: an International Journal* 39 (3): 425-432.

Swaney, A., 2017. Employee selection practices and performance pay. Available at SSRN: https://ssrn.com/abstract=2481074.

Unsworth, K. 2001. Unpacking creativity. *The Academy of Management Review* 26 (2):289-297.

Van den Steen, E., 2005. Organizational beliefs and managerial vision. Journal of Law, Economics, and Organization, 21(1), pp. 256-283.

Van den Steen, E., 2010. Culture clash: The costs and benefits of homogeneity. Management Science, 56(10), pp. 1718-1738.

Webb, R. A., M. G. Williamson, and Y. Zhang. 2013. Productivity-target difficulty, target-based pay, and outside-the-box thinking. *The Accounting Review* 88 (4): 1433-1457.

Weber, Y., 1996. Corporate cultural fit and performance in mergers and acquisitions. Human Relations, 49(9), pp. 1181-1202.

Woods, A. 2012. Subjective adjustments to objective performance measures: The influence of prior performance. *Accounting, Organizations and Society* 37 (6):403-425.

Wright, P. M., J. M. George, S. R. Farnsworth, and G. C. McMahan. 1993. "Productivity and extra-role behavior: The effects of goals and incentives on spontaneous helping." *Journal of Applied Psychology* 78.3: 374.

Zhao, H. and Liden, R.C., 2011. Internship: A recruitment and selection perspective. Journal of Applied Psychology, 96(1), pp. 221-229

www.manaraa.com

Appendix A
Process of Designing a Culture-fit Measurement System at ABC

1. The committee (C-suite and human resources executives) defines organizational values.
2. The committee extracts key indicators for each value based on its definition.
3. The committee conducts interviews with senior managers and long-tenured employees to make sure that these key indicators can reflect the values of the firm.
4. The committee works with a consulting firm to operationalize the key indicators into scenario questions.
5. The committee test runs the system among a group of good performers and bad performers.

www.manaraa.com

Appendix B
Pre-implementation Employee Survey

Instructions: Please read each statement carefully and rate how strongly you agree or disagree with it on a scale of 0–6 with 0 being "strongly disagree" and 6 being "strongly agree." There are no right or wrong answers or trick questions. Please respond as honestly as you can. All answers remain confidential.

Alignment with organizational values (used to test H2: existing subculture)

1) I can clearly articulate the organizational values and the contribution of my work to the company.
2) My company's future development prospects are consistent with my professional ideals.
3) In the long run, I can achieve my career ideals in the company.

Work environment (used to test H3: shared responsibility)

4) Senior leaders fulfill their commitment to employees.
5) Senior leaders fully empower and promote employee autonomy.
6) Senior leaders make me look forward to the future of the company.
7) Senior leaders clearly communicate organizational values.
8) My supervisor is trustworthy and provides me with the effective support I need for my job.
9) My supervisor clearly communicates organizational values.
10) My supervisor makes his/her expectations clear to me.
11) I feel comfortable communicating with my supervisor.
12) I think my colleagues care about me.
13) Colleagues respect my opinions and feelings.
14) Colleagues are willing to help when I have problems at work.
15) My company has a good communication and collaboration atmosphere.

.

www.manaraa.com

Appendix C
Instructions and Sample Question in the Culture-fit Measurement System

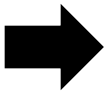
Instructions

This test will cover all kinds of real situations that you may encounter in your daily work. Please choose the one answer that best describes your reaction and the one that describes your reaction the least. Please pay attention to the following points when answering questions:

1. For each question you must choose two answers and the two cannot be the same.
2. When you answer the question, imagine that you are in the actual work environment.
3. This is not an exam. There is no right or wrong, nor good or bad answer. Please answer based on how you would behave.

Sample Question

A colleague in your department is very difficult to get along with but has strong technical skills. Recently you have been assigned to complete a project with him in order to get a job done.

Report to your manager and try to replace him with other colleagues.	**Communicate with him and actively cooperate with him.**	**You will be most likely to:**
Discuss with him, divide the work, and do your part of the work by yourself.	**Complete the project yourself and try not to contact him.**	
Think about his opinion and then decide how to complete the task.	**Try not to provoke him and cooperate with him in a very cautious way.**	**You will be least likely to:**

www.manaraa.com

Appendix D
Definitions of Variables

Variable	Definition
$Treated_i$	Indicator variable equal to 1 if employee *i* was selected through the culture-fit measurement system, and 0 otherwise
$Female_i$	Indicator variable equal to 1 if employee *i* is female, and 0 otherwise
Age_i	Age of employee *i*
$Manager_i$	Indicator variable equal to 1 if employee *i* is a manager, and 0 otherwise
Final Performance Rating$_{i,t}$	Final performance score for employee *i* in year *t*
Objective Performance Rating$_{i,t}$	Objective performance score for employee *i* in year *t*
Tenure $k_{i,t}$	Indicator variable equal to 1 if the tenure of employee *i* in year *t* is *k* (from 0 to 6), and 0 otherwise

www.manaraa.com

Appendix E
Types of Employee-Initiated Innovations

Category	Type	Description	Examples	Variable
Non Task-Specific Innovation Ideas	Long-term	Ideas that enhance the long-term success of the company	"At this stage, our company does not have a complete proofing management standard. As a result, illegal operations often occur. We shall draft a formal proofing management standard that workers should follow."	*Sub_lt*
	Group	Ideas that promote collaboration	"Due to the building setup, the offset printing plant is now separated by the detention area of the outgoing products, resulting in poor communication and inconvenience. I hope that the outer wall can be removed so that the collaboration among the workers in the offset printing plant can be largely improved."	*Sub_group*
	Different Department	Ideas that benefit other departments	One employee from storage department suggests that "defective products in stock cannot be sold and may be used to print internal documents and labels."	*Sub_diffdep*
	Cost	Ideas that decrease overhead expenses	"There are two machines that are damaged for different reasons. We can assemble the good parts of one machine to the other. As a result, we only need to buy one new machine rather than two machines."	*Sub_cost*
	Technology	Ideas that enhance to company's computerized processes and automation	"The booster pump of the company's fire protection system is pressurized every 3-5 minutes due to the sensitivity of the pressure switch and the leakage of the pipeline, resulting in the pump being often damaged and the water pressure being insufficient. I suggest to add a timing device to the pump control circuit, which not only provides a higher water pressure in the pipeline, but also increases the pressurization interval to around 20 minutes."	*Sub_tech*
	Morale	Ideas that improve team/group morale	"We can celebrate office birthdays on a monthly basis. This is a way to gain employees' sense of belongings and increase employee satisfaction."	*Sub_morale*
Task-Specific Innovation Ideas	5S	Ideas that enhance the standardization process of the standard task	"I suggest to draw a paper diagram depicting the model, configuration and operation of the laminating machine."	*Sub_5s*
	Quality	Ideas that decrease the number of bad-quality (standard task) outputs	"There is no waste disposal area between the two templates in the middle of die cutting area, which increases the probability of defective projects. I suggest to add a 3mm waste disposal area in the middle of die cutting area, so that workers can verify each product during the process."	*Sub_quality*
	Efficiency	Ideas that enhance the speed of executing the standard task	"“400 per roll” of material is currently used, resulting in too frequent machine shutdowns as materials need to be replaced. This results in wasting a lot of printing time. I suggest to order the “800 per roll” material instead."	*Sub_efficiency*

www.manaraa.com

Appendix F
Variables Definition

Innovation-related Variables	
Submission	Indicator variable assuming value 1 if the employee submits an innovation idea in month t, and zero otherwise
Approved	Indicator variable assuming value 1 if the employee submits an innovation idea that is approved and rewarded by management in month t, and zero otherwise
Sub_lt	Indicator variable assuming value 1 if the employee submits an innovation idea classified as "long-term" in month t, and zero otherwise
Sub_group	Indicator variable assuming value 1 if the employee submits an innovation idea classified as "group" in month t, and zero otherwise
Sub_diffdep	Indicator variable assuming value 1 if the employee submits an innovation idea classified as "different department" in month t, and zero otherwise
Sub_cost	Indicator variable assuming value 1 if the employee submits an innovation idea classified as "cost" in month t, and zero otherwise
Sub_tech	Indicator variable assuming value 1 if the employee submits an innovation idea classified as "technology" in month t, and zero otherwise
Sub_morale	Indicator variable assuming value 1 if the employee submits an innovation idea classified as "morale" in month t, and zero otherwise
Sub_5s	Indicator variable assuming value 1 if the employee submits an innovation idea classified as "5s" in month t, and zero otherwise
Sub_quality	Indicator variable assuming value 1 if the employee submits an innovation idea classified as "quality" in month t, and zero otherwise
Sub_efficiency	Indicator variable assuming value 1 if the employee submits an innovation idea classified as "efficiency" in month t, and zero otherwise
Contract-related Variables	
Variable	Indicator variable assuming value 1 if employee *i* is paid with a variable contract for their standard task, and zero otherwise
Mixed	Indicator variable assuming value 1 if employee *i* is paid with a mixed contract for their standard task, and zero otherwise
Fixed	Indicator variable assuming value 1 if employee *i* is paid with a fixed contract for their standard task, and zero otherwise
Employee Characteristics	
JoinAfterMerger	Indicator variable assuming value 1 if employee *i* joined the firm after the merger event, and zero otherwise
DormEmp	Indicator variable assuming value 1 if employee *i* lives in the company-sponsored accommodations, and zero otherwise
Female	Indicator variable assuming value 1 if employee *i* is a female, and zero otherwise
Age	Continuous variable capturing the age of employee *i* in years, calculated at the beginning of the sample period
Mgmt	Indicator variable assuming value 1 if employee *i* is a manger in the company, and zero otherwise
Tenure	Continuous variable capturing the tenure of employee *i* in years
Department	Categorical variable assuming values corresponding to each of the 11 departments in the site

www.manaraa.com

Appendix G
Variables Definition

Variable	Description
$PerfScore_{i,t}$	Total performance score by department i in month t
$Reward_{i,t}$	Indicator variable equal to 1 if department i receives a reward in month t, and 0 otherwise
$Penalty_{i,t}$	Indicator variable equal to 1 if department i receives a penalty in month t, and 0 otherwise
$SubjRew_{i,t}$	Indicator variable equal to 1 if department i receives a subjective reward in month t, and 0 otherwise
$SubjPen_{i,t}$	Indicator variable equal to 1 if department i receives a subjective penalty in month t, and 0 otherwise
$OppGain_{i,t}$	Indicator variable equal to 1 if department i is ranked at the bottom of the objective performance rankings in month t but does not receive a penalty, and 0 otherwise
$OppLoss_{i,t}$	Indicator variable equal to 1 if department i is ranked at the top of the objective performance rankings in month t but does not receive a reward, and 0 otherwise
$OppGainExp_{i,t}$	Indicator variable equal to 1 if department i is ranked below the department receiving a penalty in the objective performance rankings in month t but does not receive a penalty, and 0 otherwise
$OppLossExp_{i,t}$	Indicator variable equal to 1 if department i is ranked above the department receiving a reward in the objective performance rankings in month t but does not receive a reward, and 0 otherwise
$RankFirst_{i,t}$	Indicator variable equal to 1 if department i ranks at the top of the objective performance rankings in month t, and 0 otherwise
$RankLast_{i,t}$	Indicator variable equal to 1 if department i ranks at the bottom of the objective performance rankings in month t, and 0 otherwise
$BusyMonth_t$	Indicator variable equal to 1 if month t is considered to be a busy month for production, and 0 otherwise
StartYear	Indicator variable equal to 1 if month t is one of the first two months of the year, and 0 otherwise
EndYear	Indicator variable equal to 1 if month t is one of the last two months of the year, and 0 otherwise
$NEmpl_{i,t}$	Number of employees in department i in month t
$Fpct_{i,t}$	Percentage of female employees in department i in month t
$AgeLess30_{i,t}$	Percentage of employees younger than 30 in department i in month t

www.manaraa.com

Appendix H
Experimental Material

We recruited 503 participants via Amazon Mechanical Turk (M-Turk). Participants were provided with a link to an electronic survey (Qualtrics) administered by a person not involved in the research project or familiar with the purpose of the simulation.
After reading and electronically signing an informed consent, each participant was asked to read a description of the task he or she was required to perform and the description of the workplace scenario as reported in Panel A below. All participants were shown the same description of the task and the same workplace scenario.
Next, each participant was asked to answer a single question, as reported in Panel B. Each participant was assigned to one of the 10 conditions reported in the table in Panel C. Each condition included a different manipulation of the text of the question in Panel B, rendered by substituting the text "CONDITION FIRST PART" and "CONDITION SECOND PART" with the corresponding details described in the table (Panel C)

Panel A: Task Definition and Workplace Scenario

Task definition:
Researchers are studying how people respond to rewards and penalties in the workplace. You will be given a scenario describing a work environment and performance review process. In light of this description, you will be asked to describe how hard you would work under the given conditions. You may be shown a different description than others who take this survey.

Workplace scenario:
You work as part of a team for a company that rewards its workers based on team performance. Each month, management assigns each member of the best performing team a monetary bonus equal to 10% of their salary, and an equivalent monetary penalty to each member of the worst performing team.
Team performance is measured based on quantifiable aspects, such as number of units produced, number of orders processed, number of quality defects, etc. However, management can also observe other aspects of performance, such as workers' attitude, good citizenship behaviors, and favorable or unfavorable unpredictable events (examples might include unexpected mechanical problems to the production equipment, or unexpected large sales orders). Management can take into consideration all aspects of performance to make the ultimate decision about giving rewards and penalties.

Panel B: Experimental Instrument

Q: It is now the end of October. Based on the quantifiable measures of performance, **CONDITION FIRST PART**. Taking into consideration all aspects of performance, **CONDITION SECOND PART**. How much effort would you apply to your job in November compared to the effort you applied in October?

(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)
a lot less	significantly less	slightly less	same effort	slightly more	significantly more	a lot more

Why?
_____

www.manaraa.com

Panel C: Experimental Cells

Condition #	CONDITION FIRST PART	CONDITION SECOND PART
1	your team ranked at the top	management assigned the reward to your team
2	your team ranked at the bottom	management assigned the penalty to your team
3	your team ranked second from the top	management assigned the reward to your team
4	your team ranked fourth from the top	management assigned the reward to your team
5	your team ranked second from the bottom	management assigned the penalty to your team
6	your team ranked fourth from the bottom	management assigned the penalty to your team
7	your team ranked at the top	management assigned the reward to a team that ranked below yours
8	your team ranked second from the top	management assigned the reward to a team that ranked below yours
9	your team ranked at the bottom	management assigned the penalty to a team that ranked above yours
10	your team ranked second from the bottom	management assigned the penalty to a team that ranked above yours

Panel D: Post-Experimental Questions

What is your gender:
M: __ F:__ Prefer to self-describe:_____ Prefer not to answer:__

What is your age? ____

What is the highest education degree you completed?
High School or Below: __ Undergraduate: __ Graduate: __

What is your employment status?
Currently Employed, Full Time: __
Currently Employed, Part Time: __
Currently Self Employed: __
Currently Unemployed, Previously Employed: __
Currently Unemployed, Never Employed: __
Retired: __
Other (please describe): _____

How many years of work experience do you have?
Less than 2: ___ Between 2 and 5: ___ More than 5: ___

In what industry are you currently employed or have been previously employed? Please check all that apply:

www.manaraa.com

__ Banking & Financial Services
__ Education
__ Food & Beverage
__ Government & Non-Profit
__ Healthcare
__ Manufacturing
__ Media & Entertainment
__ Retail, Wholesale & Distribution
__ Software & IT Services
__ Non-Profit

Have you ever been a manager?
Yes: __ No: __

If yes, how many people did you supervise?
Less than 5: __ Between 5 and 10: __ More than 10: __

www.manaraa.com

Appendix I
Selected Quotes from the Experiment's Text-based Answers

	Response to the "Why?" question	Negative interpretation (*NegInt=1*)
Subjective reward (nominal effect)	It will motivate me to work harder	0
	Being at the top of the board is a great honor and we should strive to make the top of the list every month	0
	This is a great motivator for me.	0
	My hard work was recognized and rewarded. That would encourage more hard work from me. Not that lack of immediate reward would discourage hard work from me. Lack of pay would. There has to be incentive for me to work.	0
	That the other "non-quantifiable" aspects of performance propelled our team from fourth place to first place is important knowledge. That means we're doing a lot of things right. But if we work significantly harder and move our quantifiable measures of performance closer to the top, we can presumably greatly increase our chances of continuing to get the bonus (or at the least, guarantee that we do not end up with the monetary penalty).	0
	I think the reward structure is miserable and would not like working there. I'd continue to work as hard as I need to have job security.	1
	Working on 'rewards and penalties' for the entire team is rarely motivating, because it's not concrete and specific to outcomes. There is a lot of subjective consideration for management in the above description, and not a lot of objective specifics (example: unpredictable events, citizenship behaviors, attitude) that I, personally could control.	1
Subjective penalty (nominal effect)	I would feel unfairly penalized. My team wasn't the worst, but was assigned the penalty due a holistic view, which honestly seems a bit arbitrary. It would be hard to care about doing a good job in this situation.	1
	I was assigned a penalty despite giving good effort. Now, I could care less. I'll give the absolute minimum effort possible to keep my job. I may even try to bring down morale with co-workers out of spite.	1
	I would feel very discouraged, and this practice of penalizing groups that perform worse than others wouldn't make me feel wanted by the company. I would probably feel like putting less effort in at work.	1
	This is a very disheartening scenario. If it's understood that I performed well during this period, then I am being penalized for the failure of another team member. This offers me no incentive to try as hard, because I cannot be assured that the team member will increase their performance. Why put forth extra effort if I will still be penalized ultimately?	1

This table continues on the next page

www.manaraa.com

Appendix I (cont'd)

Subjective penalty (nominal effect) cont'd	I'd try a bit harder so we would not get the penalty again. Maybe our attitude or other more subjective things brought us to the bottom so I'd work on that.	0
	There must be a reason why my team was ranked so low in October. From November I must do more to raise my team's status and it starts with my performance.	0
Opportunity gain (opportunity effect)	I feel like my team lucked out this time but we have to improve our performance.	0
	I feel our team came up short this time, and we were very lucky to not be penalized the 10%, but everyone has to be on the same page and want to do better; it helps with camaraderie as well.	0
	Well, based off my work ethic I always try to put the most into my job. It appears from this scenario that while we had the worst performance as far as numbers go we were spared this based off another factor. I could imagine one of these factors could be our positive outlook and hard work. I would choose to continue and build upon this.	0
	I would do everything I could to prevent my team from ranking at, or near, the poorest performers. I would make sure that I was performing at my best in all controllable aspects of my work. Losing more than a month's salary could greatly impact all aspects of my life and I would be incredibly motivated to avoid that.	0
	Because I'd be worried that next time I might get the penalty, but not much more because I'm confused as to why the manager penalized the team above us instead of us, and would also worry that doing better could actually hurt me.	1
	I don't think it's fair that those that couldn't perform their best this month get punished when there are a lot of factors that sometimes you can't control.	1
Opportunity loss (opportunity effect)	We didn't get the reward we deserved, so why work harder when it doesn't matter?	1
	I couldn't consciously bring myself to apply less effort, but given my disappointment in the outcome it would be hard to motivate myself to apply more. Unfortunately using the quantifiable data is the only way to know the decision is being made fairly. Despite what management said, there could be favoritism at play in which case I would be fighting a losing battle.	1
	The system is too easily corrupted by playing favorites. I wouldn't work for the company at all.	1
	I would not feel as motivated due to the reward going to a team ranked lower in October.	1
	Meritocracy is key to a democratic and just society and decent existence. This flies in the face of the importance of meritocracy and unfairly deprives me of my deserved reward. Thus, the reason I would not work as hard as I did.	1

This table continues on the next page

www.manaraa.com

Appendix I (cont'd)

Opportunity loss (opportunity effect) cont'd	I would feel like we weren't rewarded because of things that weren't quantifiable such as our team's attitude, etc. It would make me want to work harder for the reward next month.	0
	I would usually apply a high level of effort regardless, but I would try to add a bit more so that it counted toward those aspects which aren't measurable for my team the next month.	0

www.manaraa.com