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ABSTRACT

We examine how organizational culture influenced firms' financial resilience during the COVID-19 pandemic. To investigate the relationship between culture, culture change, and financial resilience in the context of a widespread exogenous crisis, we use qualitative data from millions of employee reviews on the Glassdoor platform and employ natural language processing (NLP) techniques to estimate over 1,000 firms' cultural profiles. We provide insights on how six theoretically derived organizational culture dimensions—adaptability, results-orientation, detail-orientation, integrity, collaboration, and tightness—influenced companies' financial resilience during the COVID-19 pandemic. Our findings advance theory linking culture and culture change to financial resilience as well as explain how culture can buffer firms from the negative effects of exogenous shocks. We also highlight practical insights on how firms can leverage culture to build resilience.

Keywords: organizational culture; financial resilience; firm performance; COVID-19 pandemic; environmental volatility; cultural tightness–looseness; natural language processing

In the wake of the COVID-19 pandemic, companies and industries around the world faced enormous upheaval and vast organizational change (Altig et al., 2020; Baker, Bloom, Davis, & Terry, 2020). As a result of the pandemic, as well as past instances of disruptions emerging in the external environment, companies have faced significant earnings volatility, lower performance, and even extinction (Ding, Levine, Lin, & Xie, 2021; Gregg, Restubog, Dasborough, Xu, Deen, & He, 2022). Employees have left their jobs and shareholders have held back on investing in public companies in response to massive shocks like the COVID-19 pandemic (Huang et al., 2018). Different industries are differentially affected by a particular crisis. For example, the COVID-19 pandemic, as a public health emergency, presented greater challenges for the restaurant and airline industries than for the high technology industry (Chebbi et al., 2021). Even within industries, firm performance significantly varies in response to exogenous shocks (Fu & Shen, 2020), raising questions about the organizational-level factors that enable firms to survive and recover from such shocks.

We examine how organizational culture may have influenced firms' resilience when facing the COVID-19 pandemic. Since culture—key norms that influence what members expect and how they behave (Chatman & O'Reilly, 2016)—operates across an entire organization and influences a wide range of behaviors, it is likely integral to an organization's response to a significant shock. We trace how U.S.-based firms grappled with pandemic-related volatility, and their resulting financial resilience. Our operationalization of resilience is outcome-focused (Ilseven & Puranam, 2021; Caza et al., 2020; Raetze et al., 2022; Zolli & Healy, 2012), measured using firms' financial performance data to quantify their growth, recovery, or loss—up to three years after the onset of the pandemic, and controlling for their pre-COVID-19 financial performance.

Existing theory lacks clear and cohesive insights regarding whether and which cultural dimensions support or impede firms when they face adverse and unexpected challenges (Brown et al., 2021). Our study includes a comprehensive selection of well-established and validated cultural dimensions: Adaptability, results-orientation, detail-orientation, integrity, collaboration, and tightness (Chatman, Caldwell, O'Reilly, & Doerr, 2014; Gelfand, Nishii, & Raver, 2006). We analyze these culture dimensions individually and we also examine their impact when considered together, offering a more realistic representation of an organization's cultural profile (e.g., O'Reilly, Chatman, & Caldwell, 1991).

Some theory suggests organizations adapt to address environmental pressures, but research has typically treated organizational culture as static (Meyer, 1982; Schein, 2010). We measure firm culture both before the COVID-19 pandemic (T0) and the period immediately following its disruptive onset (T1) to investigate how pandemic-driven changes in an organization's culture may have aided firms in maintaining strong financial performance. Specifically, we examine three relationships between firm culture and financial resilience during the COVID-19 pandemic: (1)

how individual cultural dimensions influenced firm financial resilience; (2) how combinations, or patterns, of cultural dimensions influenced firm financial resilience; and (3) how the environmental shock itself may have caused firm culture to change, and whether that cultural change influenced firms' financial resilience in the face of that shock. We also examine which factors may moderate these relationships and consider data two years beyond T1 to explore the longer-term impact of the crisis.

We develop a novel natural language processing (NLP) approach to assess over 1,000 firms' cultures. We leveraged an online archive of company-level reviews from Glassdoor (www.glassdoor.com), a career intelligence platform that hosts employees' feedback and ratings. Glassdoor is a useful data source for a variety of reasons (e.g., Corritore et al., 2020). The most important benefit of using Glassdoor for this study is that pre-pandemic ratings were submitted before respondents had any knowledge of the impending pandemic and thus, their company ratings were not biased by retrospective rationality. To our knowledge, no past study has attempted to test how firm culture—measured as individual cultural dimensions, combinations of cultural dimensions, and changes in those dimensions during the study time frame—affects firm financial performance following a disruptive external shock, particularly using a sizable and diverse sample of companies. The COVID-19 pandemic, as a historical event, provides a rare and unique opportunity to study a large sample of firms from every major business sector, all facing the same volatile environmental disruption within a shared window of time.

As companies continue to seek answers to questions about how to best manage a "post-COVID" workplace (Spicer, 2020), this study aims to help develop a theory about how company culture serves as a critical strength or potential liability for firms responding to major external pressures. The impact of specific cultural dimensions, and especially their interactive

configurations and reactive changes in affecting an organization's financial resilience, is not well understood (e.g., Chatman et al., 2014). Developing deeper insight into how organizations can foster better cultural solutions for combating unanticipated challenges is essential as businesses face additional threats including climate change, growing worldwide health risks, political unrest, and an increasingly competitive and dynamic global market environment.

In the following sections, we begin by defining organizational culture and by discussing the known links between culture and organizational performance. We also review the potential influence of specific culture dimensions on organizational resilience as firms attempt to respond to major environmental shocks. Prior research has offered multiple competing possibilities, generating uncertainty about the role of these culture dimensions in fostering resilience. We also discuss why considering how organizational culture dimensions may operate together and change due to the pandemic can yield novel insights on the culture-performance link. We then provide a detailed description of our methodology and analyses. Finally, we conclude by discussing the potential for theory building about how culture influences the relationship between environmental volatility and firm performance.

Defining Organizational Culture

Organizational culture is "a system of shared values defining what is important, and norms defining appropriate attitudes and behaviors" (O'Reilly & Chatman, 1996, p.166). Although norms and values are closely related, norms specify the expected attitudes and behaviors, whereas values provide the rationale for these expectations (Parks & Guay, 2009). Organizational culture reflects the norms that act as a social control system in organizations (O'Reilly & Chatman, 1996). Norms translate into observable behaviors and attitudes, which implies that informants can reliably report on and articulate norms (Caldwell et al., 2008). This contrasts with the difficulty of identifying the

deeper and more ambiguous elements of culture such as underlying assumptions and cultural artifacts (Schein, 2010).

Managers and researchers are often interested in organizational culture because they believe that culture influences organizational performance (Chatman & O'Reilly, 2016; Hartnell et al., 2011). The evidence relevant to this commonly held assumption, however, is surprisingly mixed (Gregory et al., 2009). Researchers have tried to confirm a link between culture and firm performance (Balthazard et al., 2006; Bezrukova et al., 2012; Hartnell et al., 2019). For example, Hartnell and colleagues (2011) conducted a meta-analysis of 84 studies to understand the relationship between culture and firm performance, which they found to be equivocal. Additionally, O'Reilly et al. (2014) identified 31 more studies that explicitly investigated culture and performance. A review of these papers revealed only nine studies that found associations between culture and firm financial performance outcomes. Several of these results were less compelling due to their small sample sizes. Culture was found to be consistently related to employee attitudes and more subjective assessments of firm performance (e.g., Bezrukova et al., 2012; Denison & Mishra, 1995), but the link between organizational culture and financial performance was less consistent.

Establishing a consistent link between culture and objective firm performance measures, specifically financial outcomes, has been difficult due to various conceptual and practical challenges. This includes disagreements about how to define and measure culture (Schneider et al., 2013). For example, several scholars of organizational culture (Chatman and O'Reilly, 2016; Hartnell et al., 2019) have concluded that the failure to reliably link culture to firm performance is due to the conceptual blurriness of some of the more popular measures of culture such as the Denison Organizational Culture Survey (DOCS; Denison & Mishra, 1995) and the Competing

Values Framework (OCAI; Cameron & Quinn, 2011) that also overlap with other constructs such as organizational effectiveness and mission. Other taxonomies and measures of organizational culture have been critiqued for oversimplifying culture (Hartnell et al., 2011). A second critique that researchers have articulated pertains to methodological challenges, with studies applying small samples, failing to consider industry differences, or relying on measures that have not been validated for assessing firm culture (Chatman & O'Reilly, 2016; Detert et al., 2000). Thus, despite the widespread belief that culture and financial performance are closely related, empirical research has been equivocal.

It is possible that these mixed results could also be attributed to static (a single point in time) and narrow (a single culture dimension) approaches that fail to consider contextual influences in studying the impact of organizational culture on firm performance. Some researchers, for example, have identified potential contingencies between culture and firm strategy such as environmental turbulence (e.g., Sørensen, 2002). In this study, we assess whether emphasizing certain cultural norms, how they are patterned, and how they change influenced firm performance during and after the COVID-19 crisis. We have also included several theoretically motivated moderators, including the feasibility of remote work for a firm and the firm's COVID-19 risk perceptions, influence the relationship between organizational culture dimensions and firm performance.

Considering the Culture-Performance Link in the Context of an Exogenous Shock

The COVID-19 pandemic and firm resilience. In response to a significant crisis such as the COVID-19 pandemic, organizational and individual resources can be quickly depleted both financially and strategically. This depletion restricts an organization's capabilities and severely threatens its survival (Duncan et al., 2011; Farjoun & Starbuck, 2007; Williams & Shepherd, 2016). Firms typically experience depletion in strategic resources, which are rare, valuable, and hard to

imitate or substitute (Crook et al., 2008; Barney, 1991). These strategic resources could include expert or well-trained employees, customers and market share, reputation, patents, and unique knowledge (Barney & Arikan, 2005).

The loss of strategic resources can reduce corporate growth, production capacity, and firm distinctiveness. Indeed, recent research has shown that the COVID-19 pandemic had an overall adverse impact on firms' net profit return rates (Shen et al., 2020) and stock performance (Ding et al., 2021). Exogenous disasters can also strain human resources due to turnover and other abrupt changes in the labor market (Gittell et al., 2006; McFarland et al., 2020), and lead to reduced information sharing (Corbacioglu & Kapucu, 2006). At the individual-level, past research has found that such events lead employees to report lower job satisfaction and greater depletion of psychological resources. Vaziri and colleagues (2020), for example, found that employees were less satisfied and more likely to intend to leave their jobs when forced to work from home during the COVID-19 pandemic. Even though external shocks typically have a negative impact on companies and their employees, they can also present opportunities for some organizations, such as increasing their organizational learning capabilities (Maier et al., 2001).

Research has begun to provide some clues about the organizational factors that were characteristic of companies that fared well through the COVID-19 pandemic, in comparison to firms that did not. For example, in a study of over 11,000 Chinese firms, Shen and colleagues (2020) found that companies with lower sales revenue prior to the pandemic experienced greater financial losses during the pandemic. In another study of over 6,700 firms across 61 economies, Ding and colleagues (2021) examined the connection between multiple corporate characteristics and better stock return outcomes following the pandemic. They found the overall drop in stock returns was lower among firms with stronger pre-pandemic finances (e.g., more cash flow and less

debt), less exposure to the virus from being a more localized business; more past corporate social responsibility activities such as supporting social and environmental issues; and less "entrenched" executives, meaning firms with fewer policies protecting executives from being removed (e.g., anti-takeover devices, poison pills, supermajority amendments, or golden parachutes). Furthermore, stock returns among firms in which large stakes were held by families or governments experienced lower stock declines. In contrast, corporations with greater ownership by hedge funds or asset management companies performed worse in terms of their stock prices. No research to-date, however, has empirically examined how multiple well-defined culture dimensions, and the way they change, influence organizational resilience, particularly in the context of the COVID-19 pandemic.

Identifying cultural dimensions relevant to firms' financial resilience. In considering how culture affects firm performance following exogenous shocks, we use theoretically derived, established cultural dimensions. The Organizational Culture Profile (OCP) assesses several key cultural dimensions that researchers have validated (e.g., Chatman et al., 2014; O'Reilly et al., 1991). In contrast to previous measures that have been criticized for oversimplifying organizational culture (Hartnell et al., 2019), the OCP assessment approach and associated theory presents a more comprehensive framework that encompasses a variety of categories pertaining to organizational culture (Chatman et al., 2014). By assessing a culture's content and strength, the cultural dimensions defined by the OCP reflect the complexity, uniqueness, variety, and range of an organization's set of norms (Chatman & O'Reilly, 2016). This framework has been refined and validated by several researchers and has been shown to generalize across industries (e.g., Chatman & Jehn, 1994; Judge & Cable, 1997; Sarros et al., 2005).

We initially incorporated six previously validated OCP cultural dimensions for this study: Adaptability, results-orientation, customer-orientation, detail-orientation, integrity, and collaboration. Organizational cultures high in adaptability encourage flexibility, innovation, and experimentation. In collaborative organizational cultures, teamwork is greatly valued over autonomous efforts (e.g., Chatman & Barsade, 1995). Customer-oriented cultures place importance on providing quality customer service. A detail-oriented culture prizes accuracy and precision. Cultures of high integrity emphasize norms promoting honesty and fairness. Results-oriented cultures favor fast-action to achieve concrete short-term performance goals.

Alongside these six dimensions, we explored a seventh dimension, tightness-looseness (TL), which, research suggests, is relevant to how firms respond to crises. For example, countries characterized by tightness can be distinguished based on their response to significant national challenges (e.g., Gelfand et al., 2011). Tightness refers to the strength or degree to which norms are strongly held and strictly enforced within an organization (Gelfand et al., 2006).

Prior studies have raised the possibility that several OCP dimensions influence organizational effectiveness including financial performance, yet results have been mixed. For example, several studies have shown how companies with high cultural adaptability thrive under unfavorable conditions (Chatman et al., 2014; Williams et al., 2017; Friedman et al., 2016). Adaptation is often highlighted as a crucial indicator of organizational resilience (Välikangas, 2010; Pike et al., 2010; Vakilzadeh & Haase, 2021). Nevertheless, other studies have shown how firms that are extremely adaptable and have overly flexible cultures are less likely to develop a sustained structure or to reach collective alignment across their organization to address unexpected challenges (Hadida et al., 2015).

Likewise, businesses that are experiencing unexpected turmoil may benefit from having highly collaborative cultures (Power, 2018; Waugh & Streib, 2006). Strong relational ties are often associated with collaborative cultures and can help facilitate positive joint responses to a crisis. Collaborative cultures can support sudden switches in approaches, for example, when in-person teams need to suddenly work using virtual interfaces, as many businesses had to do during the pandemic (Wu et al., 2021). On the other hand, research has shown that among Himalayan expeditions, a context in which the risks are extreme, those that prioritized collaboration without differentiating among climbers based on their varying levels of individual climbing expertise failed to accurately assess and prioritize expertise that was critical to the expedition (Chatman et al., 2019). Instead, they favored equality norms, failing to weigh the input of expert climbers more heavily in making real-time decisions to turn back or take one route over another. Consequently, expeditions in which climbers had varying levels of expertise and embraced norms for collaboration were more likely to experience climber death. This implies that creating opportunities for individuals to tailor responses to the specific context based on their unique expertise, rather than over-relying on collective judgment, could have been more helpful for accommodating the consequences of COVID-19 at work.

Organizations high on integrity prior to the pandemic may have been in a better position to mitigate workplace uncertainty due to their histories of support and transparency. Nevertheless, a culture of integrity could be difficult to sustain as it may be harder to build trust among people and customers who are not co-located, especially as workplace trends continue to show more employers continuing to support remote work arrangements (Cascio et al., 2016). Cultural integrity is often related to perceptions that the organization is consistent in how it treats customers,

employees, and other key constituents (Chatman et al., 2014), yet this consistency could easily be disrupted when a major shock impacts an organization.

Research has also examined the broader cultural dimension of tightness-looseness that has been studied at the national level and is relevant at the organizational level, especially in the context of organizational response to crises (Gelfand et al., 2006). Tightness refers to the strength or degree to which norms are strongly held and strictly enforced within an organization (Lee & Kramer, 2016), while cultural looseness is associated with a group that exhibits greater flexibility in behavior and openness to differences. A tighter culture tends to evolve in contexts where there are high levels of threat and there is more need for rules to help coordinate and increase survival. As studied in national cultures, following major crises, cultures typically increase in tightness by enforcing stricter rule abidance to optimally address threats as a unified collective (Roos et al., 2015). Tighter cultures, therefore, are more likely to establish strong standards and practices when facing an exogenous shock that increases their chances of successfully weathering a threat. Indeed, recent research across 57 societies found that those with higher tightness had far fewer COVID-19 cases and deaths per capita (Gelfand et al., 2021). Relatedly, computational models have shown that cultures high in looseness took much longer to coordinate in the face of threats and had lower survival rates.

The question of whether tightness, which has been studied mostly at the national and state levels, can help organizations to be more financially resilient during the COVID-19 pandemic, however, remains untested. Organizations with greater tightness prior to the pandemic may coordinate faster to avoid financial decline (Gelfand et al., 2021). Culturally tighter organizations, much like tighter societies, may excel in situations that necessitate tight group coordination (Gelfand et al., 2006). Thus, companies already high on the tightness dimension may be better

prepared to manage a sudden shock. These stricter standards may come at a cost, however. If tighter firms give employees insufficient leniency and flexibility to improvise and innovate, they may be unable to navigate such a fast-moving and unprecedented situation. Past research has shown how groups' tendency to increase in tightness when they are under duress can backfire when taken too far—perhaps reminiscent of a threat-rigidity response (Staw, Sandelands, & Dutton, 1981)—resulting in a lower capacity for agility and innovation than cultures with higher looseness (Farndale & Sanders, 2017; Harrington et al., 2015; Prokopowicz et al., 2021). Indeed, in computational models, Gavrilets and colleagues (2024) found that very high levels of tightness were maladaptive for societal groups experiencing environmental shocks. Therefore, the tightness dimension provides another lens in which to examine a firm's economic resilience following a crisis, especially on the question of whether there are more benefits to providing employees with greater stringency or more license to bend the rules.

Research identifying some of the precursors to financial resilience following the COVID-19 pandemic hint at valuable insights but have not directly examined cultural factors that may explain these relationships. For example, the research conducted by Ding and colleagues (2021) found that firms that focused on social responsibility prior to the pandemic experienced less decline in stock returns. We may speculate, for example, that greater levels of social responsibility activities could reflect a firm culture high in integrity. Numerous studies of organizational resilience have more directly examined effective organizational cultures and may provide yet further clues (Barasa et al., 2018; Koronis & Ponis, 2018; Vakilzadeh & Haase, 2021). Păunescu and Argatu (2020), for example, discuss cultivating a "culture" focused on resilience response planning. Labaka and colleagues (2019) also call for a "resilience-focused culture" that involves deploying resources toward employees to teach them adversity readiness and coping mechanisms.

The organizational resilience literature identifies useful and informative organizational predictors of resilience such as supporting creativity (Walker et al., 2014), increasing transparency (Gover & Duxbury, 2018), greater collaboration (Barasa et al., 2018), and leadership that frames adverse events as learning opportunities (Sawalha, 2015). These predictors may not have been directly labeled as facets of culture, but they certainly exhibit conceptual overlap with the present study's select dimensions of organizational culture. For instance, firms that promote creativity would likely score high on cultural looseness (Prokopowicz et al., 2021). This conceptual overlap offers additional support for including the cultural variables we have selected for this study, and we aim to directly examine these potential cultural drivers using a broader and more diverse sample of organizations.

Cultural patterns and resilience. The present research also explores the optimal interplay between culture dimensions as they facilitate or impede firm performance. Specifically, this study investigates whether organizations that exhibit an optimal mix of different cultural attributes establish greater financial resilience in navigating the challenges posed by the COVID-19 pandemic. Most organizational culture research reports the independent effect of a single cultural dimension such as adaptability on firm performance (e.g., Chatman et al., 2014). Scholars have long theorized, however, that successful firms cultivate diverse capabilities, especially when managing competing interests like promoting both stability and readiness for change (O'Reilly & Tushman, 2008; Smith & Besharov, 2019; Smith & Lewis, 2011).

Our objective is also to examine the impact of different cultural configurations by initially drawing insights from studies about managing organizational polarity (O'Reilly & Tushman, 2008; Smith & Besharov, 2019). Notably, the organizational ambidexterity framework (March, 1991; O'Reilly & Tushman, 2008) focuses on the complexity that firms face in maintaining their

competitive edge—by having to balance the competing goals of exploiting existing business practices and exploring future market innovations. Thus, we also examine how various illustrative interactions among potentially conflicting OCP dimensions influence firm financial performance. Organizations that can do two non-consonant things well, as portrayed in the ambidexterity literature (e.g., O'Reilly & Tushman, 2008), may have a particular advantage in withstanding the challenges of an exogenous shock. Firms that emphasize high integrity may have more leeway to adapt in a crisis without key constituents fearing for their well-being or responding to the threat with rigidity (e.g., Staw, Sanderlands, & Dutton, 1981). Similarly firms whose cultures are both aggressively results-oriented, keeping performance as high as possible, while, at the same time, treating customers and employees well, perform better (Gillespie, Searle, Gustafsson, & Hailey, 2020). Finally, organizations that simultaneously engage members in beneficial collaboration, while at the same time enabling precision and detail-orientation before the COVID-19 pandemic may have had an advantage: Organizations in which employees are accustomed to collaborating might be more equipped to continue even when working remotely, as required by the pandemic, but those who can also stay focused on details and implementation simultaneously may perform better (Brown et al., 2021).

Using this same logic, we suggest that organizations with moderately adaptable cultures as well as moderate tightness could be more capable of addressing post-pandemic demands, which pushed firms to offer flexibility to various constituents while imposing new structural demands (Prokopowicz et al., 2021). Because research has found that tightness can amplify the effect of other culture dimensions at the societal level (Taras, Kirkman, & Steel, 2010), we also examine whether tightness interacts with other OCP dimensions on financial performance. Taken together,

these analyses aim to recognize that the impact of organizational culture on financial performance likely depends on how various cultural dimensions interact, in combination, within an organization.

We start with these theoretically derived possibilities in testing sets of cultural dimensions (e.g., results-orientation interacting with integrity, tightness interacting with adaptability). Next, we apply a *pattern* approach (Bergman, 2000; Magnusson, 1995; Schneider, 2001), which entails the designation of all the cultural dimensions, to generate insights about the interplay between various cultural dimensions that could, when examined all together, account for higher firm resilience. As such, we use cluster analysis to determine multiple sets of culture dimensions together at varying levels. This allows us to identify, for example, if a culture profile expressed by moderate adaptability, high integrity, and low collaboration has a different impact on financial resilience compared to a profile high on adaptability but low on integrity and collaboration.

Cultural change and resilience. Firms experienced extensive changes during the COVID-19 pandemic and so we will also investigate organizational culture as a dynamic phenomenon. The prevailing functionalist view of culture posits that human groups, including organizations, develop cultures in response to shifting environmental demands (Gelfand et al., 2011; Kluckhohn & Strodtbeck, 1961; Schein, 2010). Groups proceed to devise complementary systems in the form of norms and other forms of coordination that serve as the bedrock to their evolving cultures. Most research, however, examines organizational culture as static, and neglects to investigate the proposition that environmental jolts can incite cultural readjustment (see Meyer, 1982; see Sørensen, 2002 and Chatman et al., 2014 for exceptions). COVID-19 certainly caused significant disruptions for organizations—displacement, the need for personnel to adapt to new technologies like video conferencing, and large shifts in market demands. The COVID-19 pandemic provides a rare chance to empirically test the underlying assumptions of the functionalist perspective: Does

culture change following a seismic external shock, and if it does, what constitutes optimal cultural change? Moreover, which changes across cultural dimensions are more likely to help versus harm organizations? One study suggests that the COVID-19 crisis caused firms to, at least temporarily but rather rapidly, reduce their focus on being results-oriented and increase their focus on being more supportive of their employees (Brown et al., 2021). We seek to systematically explore culture change, potentially coded as "responsiveness" by employees and customers, and its potential influence on firms' financial resilience.

How feasibility of remote work and risk perceptions may influence the relationship between culture and resilience: We also examine two key COVID-19 related moderators that may affect the culture-financial resilience relationship. The first is the feasibility of remote work (Dingel & Neiman, 2020). We consider how effectively various occupations can be performed entirely at home (Dingel & Neiman, 2020). Organizations with a higher proportion of jobs that could be performed remotely likely had more flexibility in maintaining operations during lockdowns and social distancing mandates. The effectiveness of remote work in preserving financial resilience however, likely depended on how well it aligned with or was supported by the organization's existing cultural dimensions. For example, we may expect that the positive relationship between an adaptable culture and financial resilience will be stronger for organizations with a higher proportion of jobs that can be performed at home. On the other hand, the relationship between a collaborative culture and financial resilience may be negatively impacted in organizations with a higher proportion of jobs that can be performed at home. That is, while collaboration is generally beneficial, it might be challenging to maintain extremely high levels of collaboration in a remote setting.

Assessing COVID-19 risk perceptions (Stephany et al., 2022) allows us to understand the severity and immediacy of the challenges faced by different industries during the pandemic. Industries that perceive the pandemic as presenting more risk likely faced more immediate and severe disruptions, which could amplify the effects of certain cultural dimensions and diminish the benefits of others. For example, firms with higher levels of adaptability, integrity, and tightness could enable firms to be more strategically adaptable in the face of greater risk (e.g., Gavrilets et al., 2024), while firms emphasizing detail-orientation and integrity might be less able to cope with higher perceived risk. Since COVID-19 risk perceptions varied across sectors, examining perceptions of risk may offer additional nuanced understanding of how different cultural dimensions may influence firm outcomes at specific levels of identified threat to a business.

The present study aims to develop theory by resolving unknowns and ambiguities regarding the relationship between culture and firm performance, specifically how organizational culture influences firms' response to a major exogenous shock. In conducting this study, we hope to develop a theory of how organizational culture dimensions individually, in combination, and dynamically, translate into performance benefits or losses for firms in the context of an external shock.

METHOD

Data and Sample

We used 1.82 million employee reviews from Glassdoor's website to measure firm culture. Firm-level assessments provided by employees on Glassdoor have been linked to consequential organizational outcomes, from stock performance (Green et al., 2019), to a company's likelihood of committing financial fraud (Ji, Rozenbaum, & Welch, 2017). Researchers have used Glassdoor's open-ended responses from employees on the pros and cons of their workplaces to assess cultural differences across firms (Corritore et al., 2020; Sull et al., 2019).

We used elements of the Glassdoor pro and con statements to develop seven computationally derived linguistic dictionaries for each of the seven culture dimensions identified above. These indices capture both baseline levels and changes over time in these cultural dimensions derived from employee reviews. We focused on comparing the periods before the COVID-19 pandemic occurred and when it was a significantly lower threat by the end of 2021 (and we added post-2021 analyses as described below). To test the culture-performance link, we examined how culture relates to a set of standard financial performance indicators, including return on investment (ROI), return on assets (ROA), and Tobin's Q. We isolated the effect of culture on firm performance by controlling for firm size and industry sector.

We restricted our original sample of Glassdoor reviews – the "pre-shock" culture – to those written between 2014 and 2019, before the COVID-19 pandemic occurred. To examine change in culture, we compared those 2014-2019 Glassdoor reviews with those from 2020, the time following the start of the pandemic. We considered the beginning of the pandemic to be the period when most U.S. states and the federal government announced shelter-in-place and physical distancing orders, around March 2020, the timeframe in which the pandemic likely had maximum impact on companies. We also focused on publicly traded firms headquartered in the U.S. using Compustat to collate our financial outcomes data. We identified and collected reviews from Glassdoor queries that prompted employees to describe the "pros" and "cons" of the company in which they work. Glassdoor defines pros as, "Share some things this company is doing well," and cons as "Share some things this company could do better." To increase the reliability of our firm-level cultural assessments, we excluded companies that had fewer than 50 reviews per year—a standard used in past research that also used Glassdoor comments to measure firm culture (Corritore et al., 2020), and firms that were acquired during the period of interest. Our final dataset

from Glassdoor approximated 1,823,346 employee reviews and a sample of 1,113 publicly listed firms.

Measures

Firm culture dimensions. We quantified firms' cultural profiles from Glassdoor reviews by developing linguistic dictionaries for our initial set of seven cultural dimensions (adaptability, results-orientation, detail-orientation, collaboration, integrity, customer-orientation, and tightness). We first preprocessed Glassdoor reviews by combining the open-ended employee reviews and removing stopwords (e.g., "a" "the" "is"), as well as lemmatizing and lowercasing all words. Next, we applied a word embedding method (WEM), to capture the semantic similarity of words. Specifically, we relied on Global Word Vectors for Word Representation (GloVe) from the "gensim" package in Python (Pennington et al., 2014). GloVe is an unsupervised word embedding algorithm pre-trained on Wikipedia and Gigaword 5 text entries that have vectorized and charted the relationships between billions of words. Therefore, GloVe offers a comprehensive mapping of semantic relationships found between most commonly used English words. This WEM configures words as coordinates that are closer together in its multi-dimensional mapping when they share more semantic similarity. For example, "king" is semantically similar and shares a closer distance to "man" compared to the word, "woman." This produces a higher cosine similarity score (CSS) between "king" and "man" than between "king" and "woman." This approach has been used to develop dictionaries that predict societal trends (Choi et al., 2022; Jackson et al., 2019).

To account for our data's Glassdoor-specific communications context, we took the extra step of fine-tuning GloVe's pre-trained model with additional text that is more relevant to our sample of texts. This involved further training the pre-trained word vectors with texts from a set of randomly selected out-of-sample Glassdoor reviews. This leverages the linguistic knowledge of the WEM, allowing adjustments that are more specialized to Glassdoor's unique conversational

elements. By doing this, we account for the linguistic nuances that are present in Glassdoor reviews, including novel terminology and common typos employees may use to express themselves on this platform.

Next, we applied the fine-tuned algorithm to build and expand upon our dictionaries for adaptability, results-orientation, detail-orientation, integrity, collaboration, customer-orientation, and tightness. We obtained a list of terms from subject matter experts that closely relate to each dimension (our "seed words" -- see Table 1 for a sample of seed terms per dimension), which became the starting point for identifying additional terms to build our linguistic indices. Then, we obtained the top 50 words from the fine-tuned algorithm described above with the highest CSS from each seed word for each cultural dimension. Once we generated a comprehensive list of terms for each cultural dimension, four of this paper's authors independently labeled terms that were either antonyms or lacked face-valid semantic relevance to each corresponding cultural dimension. The four authors came to full agreement on the finalized list of terms that constitute the linguistic indices for all cultural dimensions of interest (see online Additional Materials Table A1 in Appendix 1).

Insert Table 1 About Here

After establishing these dictionaries, we calculated the percentage of texts among the Glassdoor reviews that contained linguistic signatures of each cultural dimension (Tausczik & Pennebaker, 2010). From the results of this scoring process, we excluded the customer-orientation dimension from our set of cultural predictors because there were too few related keywords in the sample of Glassdoor reviews.[1] Next, we aggregated the linguistic scores from the individual

[1]Less than half the Glassdoor employee reviews in our sample contained search terms from the customer-orientation dictionary. This suggests that it was not a prevalent theme among our sample of Glassdoor reviews. Therefore, we excluded this cultural dimension to avoid skewed results. Removing this dictionary did not change our sample size.

employee reviews and calculated the average detection of each cultural dimension across employee reviews at the firm-level. We aggregated these firm-level data annually from 2014-2019 to establish the pre-pandemic baseline culture for each firm (T0) and in 2020 to capture culture during the pandemic's onset (T1). In this context, "aggregated" means that we took all individual employee reviews within each period and calculated the average linguistic scores for each cultural dimension at the firm level. These two periods represent the time right before and during the early stages of the COVID-19 pandemic, enabling us to examine temporal changes in these cultural dimensions across the two time periods. Following this step, we merged the firm-level culture data with the corresponding company's financial performance data. See Table 2 for descriptive statistics on the final cultural predictors at the firm-level.

Insert Table 2 About Here

Firm performance. Return on Assets (ROA) represents a firm's capacity to capitalize on its current assets and is a widely accepted metric for assessing profitability and firm efficiency. By analyzing a firm's net income in proportion to its total assets, ROA provides insights into a company's operational efficiency. Return on Investment (ROI) assesses the success of an enterprise's investment decisions by evaluating its profit or loss ratio in relation to their incurred expenditures. Tobin's Q has been commonly used as an indicator of a firm's intangible assets and capabilities, revealing valuable insights about a company's future growth prospects (e.g., Bharadwaj et al., 1999). Tobin's Q measures the market value versus the book value of a firm and is highly correlated with firm creativity and innovation efforts (Kogan et al., 2017). Table 3 provides descriptive statistics on these select financial outcomes variables.

Insert Table 3 About Here

Control variables. To accurately assess the role of culture on firm performance, we controlled for a variety of factors. As a widely accepted metric for assessing profitability and firm

efficiency, we used the logged value of company sales to control for firm size as firm size can affect marginal gains in fiscal performance, with larger organizations having greater access to more resources and diverse revenue streams. We incorporated the specific sector of a firm as a fixed effect in our models since patterns of change in company performance over time are subject to unique industry differences and demands. It is especially important to isolate industry differences because the COVID-19 pandemic had widely varying effects on different economies (Ding et al., 2021). For example, some industries saw increased demand during the pandemic (e.g., health care firms), while others saw decreased demand (e.g., airlines). We also included a firm's pre-pandemic financial performance in our models predicting financial performance to account for between-firm financial differences prior to the pandemic. Prior firm finances have been found to be linearly related to future financial outcomes (Shen et al., 2020). Finally, we controlled for the number of reviews per firm, the average length of reviews per firm, and the average level of positive sentiment exhibited by employees towards their firms via their Glassdoor ratings. We included this latter control variable to isolate our assessment of firm culture from employees' overall affective attitudes, which are distinct from culture (Chatman & O'Reilly, 2016).[2]

Moderator variables. As noted above, we included two moderating variables in our planned analyses. The first is the feasibility of remote work score (Dingel & Neiman, 2020) that is matched to our data based on each firm's industry categorizations. To measure the feasibility of

[2] We also used this measure of employees' attitudes about their firm to check whether it mediated the connection between firm culture and performance. This set of analyses focused on the changes in workers' attitudes (from T0 to T1) as a mediating variable in the relationship between changes in organizational culture and firm performance, controlling for employee attitudes in T0. We explored how fluctuations on specific cultural dimensions contributed to either enhanced or diminished workplace satisfaction as reported by employees, as well as the repercussions these fluctuations had on firm performance. We tested whether employees' attitudes toward their firms mediated the relationship between changes found in the organizational culture and subsequent firm performance. Results of our mediation analyses yielded no significant results.

working at home, we used surveys from the Occupational Information Network (O*NET) to classify occupations based on their ability to be performed entirely at home (Dingel & Neiman, 2020). The measure identified the share of jobs within each 2-digit industry sector that could be performed at home. This index was constructed through classifying over 1,000 occupations in terms of whether the job could be performed remotely, then, aggregated by sector level (2-digit).

In addition, we draw on an established industry-level measure of corporate risk perceptions related to the COVID-19 pandemic developed by Stephany et al. (2022). The CoRisk Index is derived from an automated textual analysis of firms' 10-K reports filed with the SEC and is constructed by aggregating COVID-related keyword frequency and associated textual negativity across firms within the same industry. Using firm SIC codes mapped to two-digit NAICS sectors, Stephany et al. compute the index at the industry–time level, thereby capturing shared industry-wide perceptions of pandemic-related risk, rather than idiosyncratic firm-level views. The index is validated against external economic indicators, including industry-level unemployment rates and stock market volatility, providing evidence that these aggregated perceptions correspond to realized economic disruptions. We use this published index as an exogenous indicator of industry-level pandemic-related risk conditions.

Analysis Strategy

We tested the link between company culture and financial resilience following the disruptions caused by the COVID-19 pandemic. Our analyses focused on: (1) how individual cultural dimensions influenced firm financial resilience; (2) how combinations, or patterns, of cultural dimensions influenced firm financial resilience (interactions among pairs of culture dimensions and pattern analysis); and (3) how the environmental shock itself may have caused firm culture to change, and whether that cultural change influenced firms' financial resilience during a massive environmental shock and (4) whether two moderators, risk perceptions and

feasibility of remote work, affected the relationship between organizational culture and firm financial performance.

(1) ***How individual cultural dimensions influenced firm financial resilience.*** We first examined on how firms' cultural profiles and firm performance were linked both before and after the start of the pandemic. We timestamped the start of the pandemic in the U.S. as 2020. Therefore, our firm-level variables representing pre-pandemic baseline cultures were based on aggregated data from years prior to COVID-19 (2014-2019). We call this **T0**. Variables that were measured during the pandemic's onset were from the year 2020, or **T1**. We collected firms' financial performance data from the year 2021, **T2**, representing the period immediately following the start of the pandemic in 2020 when vaccines became available and the crisis began to abate. Finally, as additional exploratory analyses, we measured firms' performance outcomes in 2022, **T3**, and 2023, **T4**, to examine how organizational culture affects firm performance in the longer term as the COVID-19 pandemic further receded.

We used the financial metrics described above to operationalize firm performance. For our empirical analysis, we first relied on OLS models with industry fixed effects to investigate how each of the six cultural dimensions at T0 (pre-pandemic) predicted firm performance at T2, as well as T3 and T4. Next, we examined the squared coefficient for each of the six cultural dimensions to consider curvilinear effects (see Additional Materials Appendix 2), specifically, whether extremely high or extremely low levels of each dimension influenced firm performance.

(2) ***How combinations, or patterns, of cultural dimensions influenced firm financial resilience.*** Moving to the next level of complexity, we examined both how the OCP dimensions and tightness interacted to predict financial performance as well as key interactions between "polar" OCP dimensions. We then used a pattern approach (Magnusson & Torestad, 1993) to discern how

configurations of the cultural dimensions influence firm performance. Utilizing k-means clustering, we categorized firms into distinct categorical levels, or cultural profiles. These profiles included high, middle, and low scores across all variables. Subsequently, we assessed these pattern assignments using OLS models to predict firms' financial performance.

(3) ***How the environmental shock itself may have caused firm culture to change, and whether that cultural change influenced firms' financial resilience***. Finally, we estimated any changes that occurred in company culture from T0 to T1 to understand the changing workplace environment as firms adjusted their policies and procedures in response to the pandemic. After calculating this difference in culture between the two time periods, we analyzed how these shifts in the six cultural dimensions predicted firm financial outcomes at T2, T3, and T4 (our change-in-culture models). For example, for the collaboration measure, positive values would indicate an increase in collaboration post-pandemic, while negative values would suggest that firm cultures became less collaborative as the pandemic unfolded. We also examined curvilinear effects to assess whether extreme (high or low) levels of cultural change differentially impacted firm performance (results are presented in Additional Materials Appendix 2). All models included the control variables described above. As discussed above, our analysis of between-firm cultural variance on later firm performance controlled for firm financial performance at T0 to account for the change that occurred from the pre- to post-pandemic periods.

(4) ***Moderation by sector-level differences.*** For our moderation analysis, we incorporated the COVID-19 risk perceptions (Stephany et al., 2022) and the feasibility of remote work (Dingel & Neiman, 2020) measures. The former was applied toward our change-in-culture models, and the latter was applied toward further assessments of the relationship between organizational culture at T0 and firm performance at T2, T3, and T4. We included these moderators

to examine whether sector-specific conditions shaped the effectiveness of different cultural attributes during the COVID-19 shock. Given that remote work feasibility and perceived COVID-19 risk varied significantly across industries, these factors may help explain when certain cultural dimensions (e.g., collaboration or tightness) were effective.

RESULTS

In reporting our results, we begin by analyzing how pre-pandemic culture (T0) shaped firms' financial resilience during and after the COVID-19 crisis (T2, T3, T4). To do this, we examined relationships between six cultural dimensions and firm performance (ROA, Tobin's Q, ROI) from 2021 to 2023. Then, because important effects may arise from how particular pairs of culture dimensions are differentially combined in various firms, we next tested a set of illustrative interactions described above among the OCP dimensions and between them and the tightness dimension. We next examined more comprehensive profiles of culture dimensions using a pattern approach. We then examined the role of culture change during the COVID-19 shock to see how such change influenced firm performance. Finally, we examined our moderating variables (feasibility of remote work and COVID-19 risk perceptions).

The Effect of Pre-Pandemic Culture Dimensions on Financial Performance – Main Effects

Table 4 summarizes the bivariate relationships between each cultural dimension and the performance metrics.

Insert Table 4 About Here

Adaptability. We found no evidence for a main effect of pre-pandemic cultural adaptability on financial performance during and after the pandemic, as shown in Tables 5-7.

Results-orientation. Firms with more results-oriented cultures before the pandemic began in 2019 (T0) consistently outperformed their peers across all three performance metrics. Tables 5-7 show consistent effects of a pre-pandemic results-oriented culture, which was significantly

related to ROA in 2021 (T2 - β = 0.022, p < 0.01), 2022 (T3 - β = 0.037, p < 0.01), and 2023 (T4 - β = 0.019, p < 0.01), and Tobin's Q in 2021 (T2 - β = 0.340, p < 0.05), 2022 (T3 - β = 0.236, p < 0.05), and 2023 (T4 - β = 0.404, p < 0.01), and ROI in 2022 (T3 - β = 0.084, p < 0.01) and 2023 (T4 - β = 0.034, p < 0.05).

Detail-orientation. Firms with detail-oriented cultures before the pandemic began (T0) had higher ROA in 2021 (T2 - β = 0.007, p < 0.05) and 2023 (T4 - β = 0.007, p < 0.05) and higher Tobin's Q in 2023 (T4 - β = 0.14, p < 0.05), offering some evidence that operational precision became more advantageous as firms adapted to their post-crisis contexts. See Tables 5-7 for these effects.

Integrity. Firms that emphasized cultural integrity before the COVID-19 pandemic (T0) had a significantly higher ROA in 2021 (T2 – β – 0.012, P<0.01), which shifted to a significant negative relationship by the following year (T3 - β = -0.029, p < 0.05 – see Table 5).

Collaboration. Cultures that focused on being collaborative before the pandemic were no more or less likely to perform better or worse subsequently, as shown in Tables 5-7.

Tightness. Tightness at T0 was negatively associated with ROA in 2022 (T3) and 2023 (T4, see Table 5) and was negatively associated with Tobin's Q in 2023 (T4 - β = –0.191, p < 0.05), as shown in Tables 5 and 6.

In sum, the main effect findings showed that firms that emphasized being results-oriented before the pandemic performed better, most consistently, as the pandemic evolved and waned. There was some, but more limited support for the connection between being detail-oriented, emphasizing integrity, and cultural tightness before the pandemic and subsequent financial performance.

Insert Tables 5, 6, and 7 About Here

Interactions among Cultural Dimensions and their Link to Firm Performance

Moving beyond analyses focused on the independent effects of each cultural dimension (adaptability, results-orientation, detail-orientation, integrity, collaboration, and tightness) on firm performance, we examined how interactions among pairs of OCP dimensions, that could present organizations with conflicting demands (similar to the logic of ambidexterity in which firms simultaneously explore and exploit), influenced subsequent firm performance as the COVID-19 shock emerged and then waned. We also explored how the five OCP cultural dimensions interacted with tightness to influence performance. The results for all tables and figures pertaining to these analyses can be found in Tables 8–20 and Figures 1-13.

Insert Tables 8-20 and Figures 1-13 About Here

Adaptability x Integrity. Adaptability had a significant negative interaction with integrity to predict ROA in 2021 (T2 - $\beta = -0.008$, $p < .05$) as shown in Table 8 and Figure 1. ROA was the highest for firms with cultures emphasizing high integrity and low adaptability, and ROA was lowest for firms with high adaptability and low integrity. Interestingly, even firms with high integrity had lower ROA when adaptability was very high and even firms with low integrity had higher ROA when adaptability was very low. This suggests that emphasizing consistency (rather than adapting or changing existing processes and practices) may have been more valuable to firms than being ethical during the beginning of the COVID recovery period.

Results-orientation x Integrity. Results-orientation had a significant negative interaction with integrity to predict ROA in 2021 (T2 - $\beta = -0.017$, $p < .001$) and 2023 (T4 - $\beta = -0.020$, $p < .001$), as shown in Table 9 and Figure 2. Firms that emphasized both integrity and results tended to have higher ROA over the course of the COVID-19 crisis, but at the highest levels of ROA, increases in integrity were less valuable than were increases in being results-oriented. This suggests that more moderate levels of integrity were valuable in results-oriented cultures and that when a focus on integrity translates to avoiding all risks, it may reduce firm performance.

Collaboration x Detail-orientation. Collaboration had a significant negative interaction with detail-orientation to predict ROA in 2021 ($\beta = -0.009$, $p < .01$), 2022 ($\beta = -0.018$, $p < .01$), and 2023 ($\beta = -0.009$, $p < .05$), as shown in Table 10 and Figure 3, indicating that the combination of collaboration and detail-orientation reduced firm ROA across all three years. This offers some evidence that firms with cultures that emphasized both teamwork and analytical precision struggled to reconcile these competing demands effectively. Collaboration also interacted negatively with detail-orientation to predict Tobin's Q in 2022 ($\beta = -0.182$, $p < .01$) and 2023 ($\beta = -0.257$, $p < .01$), as shown in Table 11 and Figure 4. This negative interaction for market valuation mirrors the ROA findings, indicating that investors also viewed the combination of high collaboration and high detail-orientation less favorably.

Adaptability x Tightness. Tightness had a significant positive interaction with adaptability to predict ROA in 2022 ($\beta = 0.015$, $p < .01$), as shown in Table 12 and Figure 5, offering some evidence that adaptability exerted stronger effects in tight cultures, where structural mechanisms may provide the necessary accountability to complement flexible responses.

Results-orientation x Tightness. Tightness had a significant positive interaction with results-orientation to predict ROA in 2022 ($\beta = 0.023$, $p < .001$), as shown in Table 13 and Figure 6, and Tobin's Q in 2023 ($\beta = 0.163$, $p < .05$), as shown in Table 14 and Figure 7. These positive interaction coefficients indicate that effects of results-orientation were stronger in tight cultures.

Detail-orientation x Tightness. Tightness had a signification positive interaction with detail-orientation to predict ROA in 2021 ($\beta = 0.006$, $p < .05$) and 2022 ($\beta = 0.011$, $p < .05$), as shown in Table 15 and Figure 8, indicating that the effects of detail-orientation on ROA during these periods were stronger in tight cultures.

Integrity x Tightness. Tightness interacted negatively with integrity to predict ROA in 2022 ($\beta = -0.015$, $p < .05$), as shown in Table 16 and Figure 9, and to predict ROI in 2022 ($\beta = -0.037$, $p < .05$), as shown in Table 17 and Figure 10, indicating that the negative effect of integrity on performance was stronger in tighter cultures. For Tobin's Q, we found a significant positive interaction in 2023 ($\beta = 0.205$, $p < .05$), as shown in Table 18 and Figure 11, indicating that the positive impact of integrity on Tobin's Q in 2023 was stronger in tighter cultures.

Collaboration x Tightness. Tightness interacted positively with collaborative cultures to predict ROA in 2022 ($\beta = 0.021$, $p < .01$), as shown in table 19 and Figure 12, indicating that impact of collaborative cultures on ROA was stronger in tight cultures. Tightness also interacted positively with collaborative culture to predict Tobin's Q in 2021 ($\beta = 0.157$, $p < .05$) and 2023 ($\beta = 0.175$, $p < .05$), as shown in Table 20 and Figure 13. This indicates that the negative relationship between collaboration and market valuation in looser cultures was attenuated in tighter cultures.

It is notable that these interactive effects were more numerous than the main effect findings presented in the previous section. This is not surprising given that no single culture dimension exists in a vacuum, and the pattern of findings reinforce the notion that understanding the impact of culture on performance requires considering multiple culture dimensions simultaneously (Chatman & O'Reilly, 2016).

How Patterns of Cultural Dimensions, or Cultural Profiles, Influenced Firm Performance

We used a second approach to examining patterns of culture, which was to consider how all the culture dimensions at T0, in combination, influenced firm performance after the start of the COVID-19 pandemic (T2-T4). We first standardized (z-scored) each cultural dimension. Then, we applied k-means clustering to group firms into cultural profiles based on the similarity of their standardized scores across these six dimensions. K-means clustering is a distance-based partitioning technique that assigns firms to clusters by minimizing the within-cluster sum of

squares using Euclidean distance. This approach effectively groups firms that are most similar in their cultural configurations to a central point (i.e., centroid) in a multidimensional space defined by the culture variables. To determine the optimal number of clusters, we employed the Gap Statistic method (Tibshirani et al., 2001), which compares the total within-cluster variation for different cluster number estimates against values expected under a null distribution. This approach is well-suited for estimating the number of clusters, as it balances model fit with parsimony. The Gap Statistic indicated that a three-cluster solution was optimal for our k-means cluster analysis.

We interpreted the resulting three cultural profiles by examining the standardized centroid values on each cultural dimension for each profile. See Table 21 for the centroid values associated with each cultural profile. These standardized centroid values represent how each profile's configuration of cultural dimensions differ from the overall sample mean. Figure 14 provides a visual comparison of these cultural profiles using radar charts. Based on these centroid estimates, we were able to interpret Cultural Profile 1 as exhibiting a normative cultural configuration with centroid values nearing zero for each culture dimension, ranging from -0.13 to 0.03. This means there was neither a pronounced elevation nor deficiency on any of the six cultural dimensions, effectively serving as our baseline referent group. Cultural Profile 2 was distinguished by a pattern of negative values on most culture dimensions, except for tightness. This indicates Cultural Profile 2 emphasizes behavioral control, but there is low presence of adaptability, results-orientation, detail-orientation, integrity, and collaboration leanings. In stark contrast, Cultural Profile 3 exhibited low tightness, but high centroid values on all other culture dimensions, including having the highest mean for results-orientation (μ_{1j} = 0.94) out of all three cultural profiles. Cultural Profile 3 suggests a meaningful set of firms tend to exhibit a strong emphasis on all five culture

dimensions (adaptability, results-orientation, detail-orientation, integrity, and collaboration), while simultaneously being low on tightness.

Insert Table 21 and Figure 14 About Here

We regressed firm performance on these cultural profiles, incorporating Cultural Profile 1 as the reference category. Results of these analyses are presented in Tables 22-24. Across T2, T3, and T4, as the pandemic was waning, firms classified under Cultural Profile 2 consistently exhibited a significant negative association with ROA in 2021 (T2 - $\beta = -0.017$, $p < 0.05$) and 2022 (T3 - $\beta = -0.040$, $p < 0.01$), suggesting that firms characterized by higher tightness, but lower levels of adaptability, results-orientation, detail-orientation, integrity, and collaboration may experience diminished operational efficiency or profitability. Similarly, Cultural Profile 2 was significantly negatively associated with Tobin's Q in 2022 (T3 - $\beta = -0.353$, $p < 0.01$) and 2023 (T4 - $\beta = -0.487$, $p < 0.01$), but this effect emerged only in the later years of 2022 and 2023, indicating a potential delayed impact of having these cultural deficits on market valuation. A significant negative relationship between Cultural Profile 2 and ROI was also observed, though limited to the year 2022 (T3 - $\beta = -0.094$, $p < 0.05$). In contrast, firms identified as Cultural Profile 3—low on tightness, but higher on adaptability, results-orientation, detail-orientation, integrity, and collaboration—demonstrated a general trend toward higher financial performance across all three indicators (ROI, ROA, and Tobin's Q), however these positive associations did not reach traditional levels of statistical significance.

Insert Tables 22-24 About Here

The Effect of Cultural Change on Post-Pandemic Financial Performance

We next examined the effects of cultural change between T0 and T1 on ROA, Tobin's Q, and ROI at T2, T3, and T4. Overall, the effects of culture change were limited, with pre-pandemic baseline culture emerging as a more consistent predictor of financial outcomes than any changes

in culture between T0 and T1 (see Tables 25 and 26). The only finding was that an increase in results-orientation from before the pandemic (T0) to 2020 (T1) was positively associated with Tobin's Q in 2021 (T2 - $\beta = 0.183$, $p < 0.05$), but this effect did not persist into T3 or T4 (see Table 27).

Insert Tables 25-27 About Here

Moderating Effects of Remote Work Feasibility and Risk Perception

Next, we tested an interaction between remote work feasibility and cultural dimensions in predicting firm performance. Remote work feasibility significantly interacted with more collaborative cultures (T0) in predicting ROI in 2021. Having a more collaborative culture before the pandemic combined with high remote work feasibility is associated with lower ROI in 2021 (T2 - $\beta = -0.300$, $p < 0.01$). See Table 28 and Figure 15. This suggests that firms with highly collaborative cultures may have struggled to maintain their coordination and productivity advantages even when remote work is more feasible since informal communication and team cohesion may have been harder to sustain. All other interaction terms were not significant.

We tested the interaction between COVID-19 risk perception and cultural changes (T1-T0) in predicting firm performance. None of the interaction terms was significant.

Insert Table 28 and Figure 15 About Here

Additional Analyses

We include two supplemental analyses in the online Additional Materials Appendix. First, we conducted exploratory curvilinear analyses for each culture dimension (see Appendix 2). Second, as a robustness check, we applied Propensity Score Matching on sets of pre-pandemic cultural dimensions that were significant in predicting financial performance (see Appendix 3).

DISCUSSION

The COVID-19 pandemic presented an unprecedented opportunity to examine how organizational culture influences financial resilience during periods of extreme environmental

volatility. While scholars have long theorized that culture shapes organizational performance, empirical evidence linking specific cultural dimensions to objective financial outcomes has remained inconsistent, and no prior research has examined how organizational culture positions firms for environmental volatility. Using data from 1.8 million employee reviews across more than 1,100 publicly traded firms, we examined how well-established cultural dimensions—results-orientation, detail-orientation, collaboration, adaptability, integrity, and tightness—individually and in combination influenced firms' financial resilience during the COVID-19 pandemic and as the crisis waned. Moving beyond static conceptions of culture, we also investigated whether cultural change during the crisis predicted financial resilience, and we explored how two contextual factors, remote work feasibility for the firm's jobs and perceptions of risk in each firm, moderated these relationships.

Our findings reveal the power of organizational culture in affecting financial resilience, with certain dimensions providing consistent advantages while others producing nuanced, non-linear, or interactive effects. For example, organizations emphasizing being results-oriented in their culture before the COVID-19 pandemic had higher financial performance across all three of our performance outcomes (ROA, ROI, Tobin's Q) in all three of the post-pandemic time periods (except for ROI in 2021). This consistent finding suggests that firms entering periods of disruption with a strong performance-focused culture were more resilient, performing better as the crisis waned and the environment stabilized. Firms that focused on details in their culture before the pandemic also had higher ROA in 2021 and 2023. Integrity showed a temporal shift, with positive effects on ROA in 2021 reversing to negative effects by 2022. This finding is worth further investigation as it could suggest that emphasizing a culture of integrity was essential in the shorter run, such as how firms treated customers and employees, but was less important as the pandemic

waned. Finally, firms that had tighter cultures before the pandemic struck had lower ROI in 2022 (T3) and 2023 (T4) and lower Tobin's Q in 2023 (T4). Though the findings are a little inconsistent, this suggests that firms that had less tight cultures, staying more flexible, may have been better able to adjust to the dynamics of the pandemic in later stages.

We also found that performance in the earliest period that the pandemic began waning (after the COVID-19 vaccine was developed and began being administered); 2021(T2) was less affected by the content of the culture prior to the pandemic compared to the later time periods (T3-2022 and T4-2023). Specifically, as shown in Tables 5-7, only three coefficients were significant (detail-orientation and integrity were related to ROA, and results-orientation was related to Tobin's Q in 2021) compared to six significant coefficients predicting performance in 2022 (T3) and seven significant coefficients predicting performance in 2023 (T4). These data are not conclusive but might suggest that the impact of culture prior to the pandemic is more pronounced in how organizations recover from an exogenous event rather than how they manage in the earlier stages of the crisis.

There were several cultural attributes that did not influence firm performance, including adaptability, which revealed no main effects across the three dependent variables and time periods. One explanation for the lack of effects is that our approach to assessing culture using Glassdoor was not conducive to assessing culture strength. Previous research has shown that the adaptability culture dimension is associated with performance only when there is high agreement about the culture across an organization (Chatman et al., 2014). Our inability to assess culture strength independent of the culture content dimensions in the Glassdoor data set that we used in the current study may have led to null effects. Future research should consider ways to assess culture strength using large language models. It is also possible that our study's timeframe, and, indeed, the acute

phase of the COVID-19 pandemic was shorter than other research (e.g., Chatman et al., 2014) showing that adaptability is correlated with a firm's financial performance. Adaptability, which requires not just coming up with new ideas, but implementing them, may be a cultural norm that takes longer to execute. In contrast, being results oriented, which focused on delivering on goals and routines that are already in place, enables firms to maintain higher performance in the short run. Future research might examine variations in the length and impact of exogenous crises, by for example, determining whether they fundamentally transform industries. In contrast to well-studied disruptions like major technological advancements in which companies must adapt or die (e.g., Henderson & Clark, 1990), the COVID pandemic may not have altered, for the long term, the way firms needed to conduct their business. For example, even the most enduring impact of the COVID-pandemic, which was to accelerate (but not initiate) remote work, has waned (e.g., Aksoy et al., 2025).

It is notable that the tightness dimension was not correlated with the adaptability dimension (r=.005, n.s.). This lack of relationship is surprising given the conceptual connections between adaptability and looseness (e.g., Chatman et al., 2014; Gelfand et al., 2011). Tightness/looseness research has not distinguished between culture content and strength and so it may be that the construct includes both, again, suggesting that future research should identify valid ways to measure and distinguish between culture content and strength.

In addition to finding that certain culture dimensions influenced financial resilience, we found that certain pairs of cultural dimensions assessed before the pandemic interacted to predict financial performance. The most consistent finding across the dependent variables and time periods was the interactive effects on ROA and Tobin's Q of a culture's levels of collaboration and detail-orientation. Interestingly, firms that, before the pandemic, were both higher on detail-

orientation and lower on collaboration had higher ROA at T2 and T4 and higher Tobin's Q at T3 and T4. At the same time, firms that were lower on detail-orientation and higher on collaboration before the pandemic also had higher ROA at T2, T3, and T4. Thus, there appear to be two paths to setting up culture for resilience in the face of a crisis; either focus extensively on details without emphasizing collaboration or focus on collaboration but not on being detail-oriented. Emphasizing both details and collaboration was less helpful in boosting financial performance after the pandemic perhaps because spreading out responsibility (collaboration) may reduce a firm's ability to track details as effectively and conversely tracking details may be easier when individual responsibility is clear. Note that the correlation between the two culture dimensions is significant and positive ($r=.355$, $p<.05$) suggesting that it may be rarer for firms to emphasize one and not the other.

A second finding is that being results-oriented moderated how highly firms needed to emphasize integrity to perform better. Those firms that emphasized being results-oriented but were not as focused on integrity in their cultures before the pandemic had higher ROA in 2021 (T2) and 2023 (T4). This could suggest that being known for emphasizing results may be more important than emphasizing high integrity in the midst of a crisis like COVID-19. Notably, our sample is made up as publicly traded firms and shareholder pressure may have driven these results in the shorter run, or generating results to retain employees during the pandemic could have been a higher priority than professing integrity. The relatively short length of the pandemic, with the acute phase being just a year or two, may have favored focusing on results, while investing heavily in ensuring employees viewed leaders as high integrity when the meaning of integrity was dynamic could have distracted organizations from focusing on results. Nonetheless, our findings can be seen as contradicting research showing that higher integrity is associated with higher performance

(e.g., Li et al., 2021). Interestingly, Guiso and colleagues (2015) distinguished between claimed integrity, in which integrity is claimed in corporate branding like websites and mottos, and perceived integrity, in which employees view executives as trustworthy and ethical. Only perceived integrity is associated with higher performance, but our approach to measuring integrity through Glassdoor ratings may have picked up employees' assessments of claimed culture too. Future research should examine these distinctions directly. Future research should also investigate how long this pattern holds up as emphasizing lower integrity is likely to become ultimately disadvantageous for firms.

Finally, firms that emphasized integrity but not being adaptable tended to have higher ROA in one period – 2021 (T2). This is not a consistent effect across time frames and dependent variables, but it suggests that firms might experience higher ROA if they emphasize stability and integrity.

We also examined whether tightness interacted with OCP dimensions to predict firm performance. The possibility that tightness may be assessing the strength of an organization's culture rather than specific content is strengthened by these interaction findings. We found that the positive effects of being results-oriented, detail-oriented, and adaptable before the pandemic occurred strengthened performance (ROA) when cultures were also tight cultures, particularly during T3—2022. This suggests that structural clarity and accountability mechanisms help translate these cultural orientations into tangible results. The direction of the interaction between tightness and integrity differed across performance metrics. Tightness interacted positively with collaboration in predicting ROA in Time 3 (2022) and Tobin's Q in Times 2 (2021) and 4 (2023). For Tobin's Q, tighter cultures attenuated the negative association between collaboration and market valuation. For integrity, both the negative effects of integrity on operational performance

in Time 3 (2022) and the positive effect of integrity on investor perceptions were strengthened in tight cultures in Time 4 (2023). More generally, this is consistent with previous research that shows that tightness can amplify the effects of societal culture dimensions on outcomes (Taras et al., 2010).

Beyond examining pairs of culture dimensions, we also examined how patterns of culture—rather than isolated dimensions—shaped firms' financial resilience during COVID-19 by identifying three cultural profiles using k-means clustering. The resulting profiles included a baseline Profile 1 characterized by culturally neutral scores across all dimensions, a Profile 2 marked by high tightness coupled with low levels on all other culture dimensions, and a Profile 3 defined by low tightness alongside higher scores on the remaining five cultural strengths. These configurations meaningfully predicted performance: firms in Profile 2 consistently underperformed across ROA, ROI, and Tobin's Q, exhibiting both immediate and delayed financial declines, suggesting that cultures emphasizing behavioral control (tightness) without other cultural strengths may be especially vulnerable in times of crisis.

We also investigated whether the pandemic itself prompted meaningful shifts in firm culture and whether such changes contributed to firms' subsequent financial resilience. By assessing change in each cultural dimension from T0 to T1, we captured how organizations reconfigured their cultures during the early stages of COVID-19. We then used these cultural shifts to predict financial outcomes in subsequent years. Evidence for the impact of cultural change across the six dimensions was limited. The only significant effect was that increases in results-orientation predicted higher Tobin's Q in 2021, an association that did not persist into later years. The paucity of findings for cultural change suggests that rapid, short-term adjustments in culture may have had only marginal influence on firms' financial trajectories during the pandemic. Instead,

the stability of pre-pandemic cultural foundations appears to have been far more consequential, underscoring the enduring role of an established cultural system.

Finally, we examined whether COVID-19 risk perceptions (Stephany et al., 2022) and the feasibility of remote work (Dingel & Neiman, 2020) moderated the relationship between cultural dimensions and firm performance. COVID-19 risk perceptions did not moderate any cultural dimensions. Our moderation analyses did, however, indicate that the feasibility of remote work negatively moderated the relationship between collaboration and firm performance. This pattern suggests collaborative firms in industries where remote work is more feasible were the ones that struggled most when they could not work together in person. In-person collaboration may have been a critical part of their performance, in ways that could not be fully replicated in a remote environment.

Notably, this study included multiple years of performance to examine how culture affected resilience over time. Effects varied by year but considering the single dimensions (main effects) and interaction effects together, T3 (2022) and T4 (2023) each had 13 significant coefficients, while (T2) 2021 had fewer at 10 significant coefficients. Future research should examine the temporal nature of the culture-performance relationship in the context of a crisis as it is possible that organizational culture influences firm performance after the height of a shock, when firms are transitioning from emergency response to normal operations.

We also examined multiple aspects of firm performance by using three measures of financial performance – ROA, Tobin's Q, and ROI. The most consistent effects were for ROA, which, across the main effects and interactions was predicted by 21 significant coefficients, while Tobin's Q was significantly predicted 12 times, and ROI was only predicted by three coefficients. It is possible that ROA is most implicated in a global crisis as it is the most direct measure of how

well management is deriving profit out of the resources they have. ROA is a highly relevant metric reflecting a firm's viability through internal operational efficiency and profitability, likely to be salient to investors during the pandemic. Tobin's Q has been viewed as more perceptually based and may have shown slightly fewer effects because perceptions of the firms' intangible assets were slower to change or harder to assess than measurable results apparent in ROA. Finally, ROI may have been less relevant as firms were typically working to survive the crisis rather than using it as a time to invest in innovation and the market may have reduced its focus on this as relevant metric during the pandemic. These explanations are speculative and future research should identify the mechanisms underlying these differences.

Our findings provide novel insights into how organizational culture dimensions and their combinations were related to firms' financial resilience in the face of a major environmental shock and how certain cultural dimensions, most notably result-oriented, may have buffered firms from experiencing the negative impact of the pandemic on their performance and provides the building blocks for a theory of the culture-performance relationship when the environment is changing quickly. We found that the most significant effects resulted from the combination of cultural dimensions rather than individual dimensions, a useful reminder that culture dimensions exist as a profile rather than as stand-alone singular constructs. This is also the first study we know of to consider both OCP culture dimensions and tightness, which may provide insight into how the individual culture dimensions are amplified or mitigated by tightness, which may be a way of assessing culture strength. Additionally, this study contributes to a useful set of dictionaries for assessing culture from natural language that could be used in a variety of digital data sources beyond Glassdoor (e.g., email, Slack).

Study limitations and implications for building theory. Our study offers a variety of insights about the dynamics of organizational culture and has a variety of conceptual and methodological limitations that are also helpful in thinking about future theory and research. One conceptual limitation is that our focus on the COVID-19 pandemic, while providing a natural experiment for studying culture under extreme conditions, limits the generalizability of our findings to other types of organizational shocks or normal operating conditions. The pandemic's unique characteristics may have activated specific cultural dimensions in ways that differ from other crises such as financial downturns, technological disruptions, or competitive threats. Likewise, climate change, which like COVID-19 has also reached an acute level and has risks that those affected do not agree about, is still different in that it is prolonged and slower moving. Importantly, climate change, to this point at least, has not disrupted people's ability to work together in an office. In the longer run, however, climate change is likely to vastly change where people can live comfortably, altering labor markets. It has already made employees susceptible to disruptions in their work resulting from wildfires in residential areas and heat events and pollution that cause health effects. Organizational cultures that have greater flexibility in work modes could be better positioned to weather (no pun intended) such events. Additionally, our post-pandemic observation period (2021-2023) may be insufficient to capture longer-term cultural adaptations or performance effects that unfold over multiple years. Future theory about how culture influences performance clearly needs to carefully consider the temporal nature of the relationship as our research shows that the relationship may change in important ways over time.

Another type of limitation stems from our level of analysis. In focusing on the organizational level of analysis, we are not focusing on the individual, industry, or national levels, which may both interact with organizational cultures and directly influence performance

outcomes. Consider the industry level of analysis and the issue of demand versus supply, which might interact with culture to affect performance. On-site dining establishments and outside entertainment (e.g., theaters) suffered demand challenges while the automobile industry and health care were challenged with supply-chain issues that could have affected its financial outcomes. We partially account for these types of alternative explanations by controlling for industry, but researchers might continue to examine how these issues create potential alternative explanations for lower financial performance or profitability.

We also defined resilience in terms of financial resilience, but other forms of resilience might be important in understanding the impact of culture in the context of a global crisis. Firm level financial resilience may relate to other types of resilience across levels of analyses, such as how employees respond to a crisis. For example, employees' capacity to endure and adapt may require emphasizing a different culture than the dimensions identified here. We focused on cultural dimensions that maximize financial performance, such as being results-oriented, but other constructs both cultural and attitudinal in nature might also be important to maximize psychological and social resilience. This might require focusing on things like psychological safety and supporting people. Further, culture may act as a buffer for some, but perhaps not all forms of resilience. For example, a company's internal culture may not be accessible to external stakeholders, and this may mean that firms need to focus on building relational resilience such as stakeholder trust and external reputation through other means such as communications and reputational management. Future research might consider a variety of forms of resilience and how they operate together or diverge in the context of a global crisis and how each is, or is not, influenced by company culture.

Perhaps the most significant methodological limitation is our reliance on Glassdoor reviews as the sole measure of firm culture. Using Glassdoor data, while advantageous in terms of collecting large samples from many firms and avoiding demand effects since it is unobtrusive, introduces other challenges. One challenge is that Glassdoor responses are not explicitly focused on organizational culture, raising potential construct validity concerns (Chatman & O'Reilly, 2016). A second issue is that there may be significant selection bias in that only those employees who have a strong view of the culture – positive or negative – may be motivated to take the additional step of voluntarily posting their view of the organization on the platform (e.g., Corritore et al., 2020). Further, user submission requirements imposed by Glassdoor may bias who is able to provide a review. Employees needed to submit a review of their own organization to view reviews of other organizations, potentially favoring employees who were seeking to leave their organizations and having a more negative view of their current organization's culture. And finally, though we collected data for our study before AI was fully unleased, even our "early" data could have been biased by undetected bots. We tried to mitigate these issues by using an existing culture content framework. Future research should triangulate these findings with other measures of culture, such as internal surveys, ethnographic studies, or other forms of textual analysis from different sources (e.g., company reports, internal communications).

Relatedly, we fine-tuned a pre-trained GloVe word-embedding model to establish linguistic indices for assessing organizational culture from Glassdoor reviews. While this approach has been fruitful in assessing other constructs in the social sciences—from moralized sentiments on social media (Garten et al., 2018) to national threat levels (Choi et al., 2022) to occupational stereotypes (Garg et al., 2018)—there are other computational approaches that have been evolving to linguistically measure constructs such as Bidirectional Encoder Representations from

Transformers (BERT, Abdurahman et al., 2025) and its derivatives. Given that this is a dynamic methodological domain, our ability to research and assess organizational culture through such unobtrusive measures will only increase. Future research should compare the growing range of available approaches to best capture their constructs of interest.

Some of our measures could usefully be validated with additional measures in future research. For example, the descriptions of COVID-19 risk in the 10-K reports that we used to represent resilience may be more about managing investor perceptions and explaining away poor performance (e.g., Salancik & Meindl, 1984) rather than a resilient response. The measure suggests that industries varied in their reported negative attitude toward COVID-19 over time.

Finally, while our use of Propensity Score Matching (PSM) helped to address endogeneity concerns and move closer to causal inference, we cannot make definitive cause-and-effect claims. Our results, particularly from the PSM analysis, were marginally significant for results-oriented culture and ROA, which we attribute to the reduced sample size and lower statistical power. Furthermore, PSM only accounts for observed covariates (e.g., firm size and industry), and unobserved factors could still influence the relationship between culture and performance. Future studies could employ quasi-experimental designs or longitudinal data with more granular controls to further isolate the impact of culture on performance.

Future Directions. Building on the insights and limitations, this research opens several exciting avenues for future discovery. For example, our findings suggest opportunities for theory building around the interaction of OCP dimensions and tightness. The results of some cultural dimensions (adaptability, results-orientation, detail-orientation) were strengthened in tight cultures, which raises fundamental questions about how the strength of norms channels cultural content, validating previous research assessing the interaction of adaptability and culture strength on firm

financial performance (Chatman et al., 2014). Future research should investigate the specific mechanisms through which tight cultures transform other cultural dimensions into performance outcomes. Qualitative studies could trace how employees in stronger cultures enact the same cultural values differently in practice, revealing why the strength of norms alters culture's effects (e.g., Sørensen, 2002).

Our findings also illustrate that the situational context of COVID-19 moderates the impact of cultural dimensions on performance. Notably, while collaborative cultures are typically seen as positive for organizational outcomes, they significantly underperformed when remote work feasibility was high. This suggests that collaborative cultures, which may rely on informal, spontaneous interactions and physical co-presence to maintain their coordination advantages—are disrupted with high feasibility of remote work. Future research should investigate what specific collaborative practices break down in remote settings and what interventions can sustain or even enhanced collaboration in these contexts. A key question is how organizations can develop virtual collaboration capabilities in such contexts.

Interestingly, the limited significance of cultural change variables compared to baseline culture levels points to the importance of cultural inertia and path dependence. Future research could investigate the mechanisms through which established cultural patterns persist during disruptions and the conditions under which fundamental cultural transformation becomes possible.

Lastly, our findings raise important questions about cultural malleability and intervention effectiveness. Can organizations deliberately cultivate results-oriented or detail-oriented cultures, or do these dimensions emerge from deeper structural and historical factors? Field experiments and natural experiments could test whether targeted cultural interventions successfully shift cultural dimensions and subsequent performance outcomes.

CONCLUSION

This study expands our knowledge of organizational culture and its significance in the context of adverse events such as the COVID-19 pandemic, as well as resolving the equivocal relationship between organizational culture and firm resilience. By identifying which cultural dimensions—and which combinations of them—are associated with financial resilience, our findings may help to identify the mechanisms through which culture influences organizational outcomes during challenging circumstances. From a practical perspective, our findings can potentially offer valuable guidance for firms and practitioners aiming to enhance their readiness to face crises. Identifying cultural dimensions that promote financial resilience can help organizations to develop and foster the culture needed to navigate through future crises effectively. Understanding the importance and function of various cultural dimensions can inform strategic decision-making and interventions aimed at promoting organizational financial resilience.

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TABLE 1 Sample Seed Words for the Final Cultural Dimensions

Cultural Dimension			
Adaptability	innovate	experiment	adapt
	risk	fast	move
Results-orientation	direct	expectation	achievement
	driven	performance	aggressive
Detail-orientation	precision	quality	attentive
	precise	attention	detail
Integrity	integrity	ethical	respectful
	honest	standard	fair
Collaboration	collaborate	team	supportive
	collaboration	support	cooperative
Looseness	allow	openness	personalize
	flexibility	leeway	variability
Tightness	restrain	enforce	govern
	comply	uniformity	forbid

TABLE 2 Descriptive Statistics for Final Firm-Level Culture Measures

Cultural Dimension	N	Mean	SD	Min	Max
Adaptability	1037	5.71	1.23	2.23	10.36
Results-orientation	1036	3.54	1.07	1.06	10.0
Detail-orientation	1017	2.53	1.38	0.07	10.0
Integrity	1037	3.57	1.07	1.13	7.83
Collaboration	1034	3.38	1.31	0.05	11.86
Tightness	1037	-3.83	1.17	-9.18	0.32

TABLE 3 Annual Firm-Level Averages for Financial Outcome Variables

Fiscal Year	ROA	ROI	Tobin's Q
2019	0.03	0.05	2.43
2020	0.01	-0.03	2.78
2021	0.05	0.09	2.82
2022	0.02	0.05	2.10
2023	0.03	0.07	2.35

TABLE 4 Correlation Table: Culture Dimensions and Performance Measures

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Average Size (T0)	1	0.069	0.278	-0.035	0.448	0.498	0.313	0.392	0.288	0.005	-0.019	0.106	0.105	-0.306	-0.234	-0.236	-0.033	0.103	0.049
2. Overall Rating (T0)	0.069	1	-0.006	0.062	0.123	0.085	-0.04	-0.065	-0.153	0.032	-0.042	0.029	0.054	0.284	0.24	0.248	0.041	0.112	0.088
3. Review Count (T0)	0.278	-0.006	1	0.025	0.111	0.156	0.079	0.137	0.129	0.05	0.076	0.047	0.084	0.002	0.035	0.02	0.012	0.039	0.056
4. Word Count (T0)	-0.035	0.062	0.025	1	-0.036	-0.02	-0.055	-0.075	-0.071	0.775	0.034	-0.013	0.014	0.035	-0.001	0.004	0.015	0.003	-0.033
5. Adaptability (T0)	0.448	0.123	0.111	-0.036	1	0.659	0.421	0.612	0.543	0.005	0.079	0.148	0.135	-0.058	-0.003	-0.022	-0.011	0.14	0.062
6. Results-Orientation (T0)	0.498	0.085	0.156	-0.02	0.659	1	0.455	0.548	0.461	0.077	0.169	0.207	0.217	-0.105	-0.031	-0.032	0.021	0.179	0.108
7. Detail-Orientation (T0)	0.313	-0.04	0.079	-0.055	0.421	0.455	1	0.445	0.355	0.023	0.11	0.137	0.155	-0.081	0.003	-0.007	-0.008	0.086	0.07
8. Integrity (T0)	0.392	-0.065	0.137	-0.075	0.612	0.548	0.445	1	0.571	-0.001	0.163	0.113	0.139	-0.23	-0.139	-0.164	0.025	0.127	0.059
9. Collaboration (T0)	0.288	-0.153	0.129	-0.071	0.543	0.461	0.355	0.571	1	-0.026	0.084	0.164	0.094	-0.231	-0.153	-0.181	-0.051	0.096	0.012
10. Tightness (T0)	0.005	0.032	0.05	0.775	0.005	0.077	0.023	-0.001	-0.026	1	0.039	-0.054	-0.001	0.001	-0.037	-0.038	0.037	-0.016	-0.026
11. ROA (T2)	-0.019	-0.042	0.076	0.034	0.079	0.169	0.11	0.163	0.084	0.039	1	0.503	0.611	0.242	0.331	0.269	0.053	0.248	0.322
12. ROA (T3)	0.106	0.029	0.047	-0.013	0.148	0.207	0.137	0.113	0.164	-0.054	0.503	1	0.522	0.121	0.211	0.165	0.018	0.6	0.261
13. ROA (T4)	0.105	0.054	0.084	0.014	0.135	0.217	0.155	0.139	0.094	-0.001	0.611	0.522	1	0.292	0.45	0.411	-0.011	0.394	0.547
14. Tobin's Q (T2)	-0.306	0.284	0.002	0.035	-0.058	-0.105	-0.081	-0.23	-0.231	0.001	0.242	0.121	0.292	1	0.873	0.867	0.092	0.119	0.25
15. Tobin's Q (T3)	-0.234	0.24	0.035	-0.001	-0.003	-0.031	0.003	-0.139	-0.153	-0.037	0.331	0.211	0.45	0.873	1	0.932	0.073	0.164	0.365
16. Tobin's Q (T4)	-0.236	0.248	0.02	0.004	-0.022	-0.032	-0.007	-0.164	-0.181	-0.038	0.269	0.165	0.411	0.867	0.932	1	0.041	0.112	0.315
17. ROI (T2)	-0.033	0.041	0.012	0.015	-0.011	0.021	-0.008	0.025	-0.051	0.037	0.053	0.018	-0.011	0.092	0.073	0.041	1	0.547	0.506
18. ROI (T3)	0.103	0.112	0.039	0.003	0.14	0.179	0.086	0.127	0.096	-0.016	0.248	0.6	0.394	0.119	0.164	0.112	0.547	1	0.321
19. ROI (T4)	0.049	0.088	0.056	-0.033	0.062	0.108	0.07	0.059	0.012	-0.026	0.322	0.261	0.547	0.25	0.365	0.315	0.506	0.321	1

TABLE 5 OLS Results Predicting ROA from Baseline Firm Culture Dimensions

	Dependent variables:		
	ROA (2021) (T2)	ROA (2022) (T3)	ROA (2023) (T4)
Adaptability (T0)	-0.01	0.00	-0.00
	(0.01)	(0.01)	(0.01)
Results-Orientation (T0)	0.02***	0.04**	0.02**
	(0.01)	(0.01)	(0.01)
Detail-Orientation (T0)	0.01*	0.01	0.01*
	(0.00)	(0.01)	(0.00)
Integrity (T0)	0.01**	-0.03*	-0.01
	(0.01)	(0.01)	(0.01)
Collaboration (T0)	-0.01	0.02	-0.01
	(0.01)	(0.01)	(0.01)
Tightness (T0)	-0.01	-0.03***	-0.01**
	(0.00)	(0.01)	(0.00)
Constant	0.03	-0.27***	-0.15***
	(0.04)	(0.08)	(0.04)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.37	0.26	0.35
Adjusted R^2	0.31	0.19	0.28
Residual Std. Error	0.07 (df = 817)	0.14 (df = 791)	0.07 (df = 767)
F Statistic	6.48*** (df = 74; 817)	3.67*** (df = 74; 791)	5.49*** (df = 74; 767)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 6 OLS Results Predicting Tobin's Q from Baseline Firm Culture Dimensions

	Dependent variables:		
	Tobin's Q (2021) (T2)	Tobin's Q (2022) (T3)	Tobin's Q (2023) (T4)
Adaptability (T0)	0.14	0.01	-0.01
	(0.13)	(0.09)	(0.13)
Results-Orientation (T0)	0.34*	0.24*	0.40**
	(0.15)	(0.10)	(0.14)
Detail-Orientation (T0)	0.00	0.11	0.14*
	(0.09)	(0.06)	(0.08)
Integrity (T0)	-0.00	0.08	0.06
	(0.15)	(0.10)	(0.14)
Collaboration (T0)	-0.15	-0.07	-0.18
	(0.12)	(0.08)	(0.11)
Tightness (T0)	-0.06	-0.10	-0.19*
	(0.10)	(0.06)	(0.09)
Constant	-0.82	-0.19	-2.19*
	(1.01)	(0.67)	(0.97)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.63	0.55	0.52
Adjusted R^2	0.59	0.51	0.47
Residual Std. Error	1.78 (df = 817)	1.15 (df = 791)	1.63 (df = 767)
F Statistic	18.44*** (df = 74; 817)	13.09*** (df = 74; 791)	11.25*** (df = 74; 767)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 7 OLS Results Predicting ROI from Baseline Firm Culture Dimensions

	Dependent variables:		
	ROI (2021) (T2)	ROI (2022) (T3)	ROI (2023) (T4)
Adaptability (T0)	-0.05	0.00	-0.01
	(0.05)	(0.03)	(0.02)
Results-Orientation (T0)	0.08	0.08**	0.03*
	(0.06)	(0.03)	(0.02)
Detail-Orientation (T0)	-0.00	0.00	0.01
	(0.04)	(0.02)	(0.01)
Integrity (T0)	0.11	0.01	-0.00
	(0.06)	(0.03)	(0.02)
Collaboration (T0)	-0.10	0.00	-0.02
	(0.05)	(0.02)	(0.01)
Tightness (T0)	0.02	-0.03	-0.01
	(0.04)	(0.02)	(0.01)
Constant	0.26	-0.56**	-0.19
	(0.42)	(0.20)	(0.12)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.04	0.13	0.14
Adjusted R^2	-0.05	0.05	0.06
Residual Std. Error	0.74 (df = 817)	0.35 (df = 791)	0.19 (df = 767)
F Statistic	0.40 (df = 74; 817)	1.65** (df = 74; 791)	1.67** (df = 74; 767)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 8 ROA: Interaction of Adaptability and Integrity

	Dependent variables:		
	ROA (2021) (T2)	ROA (2022) (T3)	ROA (2023) (T4)
Adaptability x Integrity	-0.01*	0.01	-0.01
	(0.00)	(0.01)	(0.004)
Adaptability	0.01	-0.04	0.008
	(0.01)	(0.03)	(0.014)
Integrity	0.07**	-0.09*	0.031
	(0.02)	(0.04)	(0.023)
Constant	-0.16	-0.15	-0.273*
	(0.10)	(0.20)	(0.106)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.45	0.27	0.42
Adjusted R^2	0.40	0.20	0.36
Residual Std. Error	0.07 (df = 814)	0.14 (df = 788)	0.07 (df = 764)
F Statistic	8.66*** (df = 77; 814)	3.83*** (df = 77; 788)	7.09*** (df = 77; 764)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 9 ROA: Interaction of Results-orientation and Integrity

	Dependent variables:		
	ROA (2021) (T2)	ROA (2022) (T3)	ROA (2023) (T4)
Results-orientation x Integrity	-0.02***	0.01	-0.02***
	(0.01)	(0.01)	(0.01)
Results-orientation	0.08***	0.02	0.08***
	(0.02)	(0.04)	(0.02)
Integrity	0.07***	-0.04	0.07***
	(0.02)	(0.03)	(0.02)
Constant	-0.20*	-0.29	-0.39***
	(0.09)	(0.19)	(0.10)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.455	0.271	0.426
Adjusted R^2	0.403	0.199	0.368
Residual Std. Error	0.066 (df = 814)	0.135 (df = 788)	0.07 (df = 764)
F Statistic	8.810*** (df = 77; 814)	3.796*** (df = 77; 788)	7.354*** (df = 77; 764)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 10 ROA: Interaction of Collaboration and Detail-orientation

	Dependent variables:		
	ROA (2021) (T2)	ROA (2022) (T3)	ROA (2023) (T4)
Collaboration x Detail-orientation	-0.009**	-0.018**	-0.009*
	(0.003)	(0.007)	(0.004)
Collaboration	0.016	0.059***	0.018*
	(0.008)	(0.017)	(0.009)
Detail-orientation	0.031**	0.062**	0.031**
	(0.010)	(0.021)	(0.011)
Constant	-0.084	-0.445**	-0.248**
	(0.080)	(0.162)	(0.085)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.452	0.276	0.421
Adjusted R^2	0.400	0.206	0.362
Residual Std. Error	0.066 (df = 814)	0.134 (df = 788)	0.070 (df = 764)
F Statistic	8.724*** (df = 77; 814)	3.910*** (df = 77; 788)	7.202*** (df = 77; 764)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 11 Tobin's Q: Interaction of Collaboration and Detail-orientation

	Dependent variables:		
	Tobin's Q (2021) (T2)	Tobin's Q (2022) (T3)	Tobin's Q (2023) (T4)
Collaboration x Detail-orientation	-0.165	-0.182**	-0.257**
	(0.091)	(0.057)	(0.082)
Collaboration	0.167	0.286*	0.339
	(0.220)	(0.140)	(0.203)
Detail-orientation	0.467	0.612***	0.854***
	(0.275)	(0.172)	(0.249)
Constant	-2.264	-1.611	-3.996*
	(2.109)	(1.309)	(1.894)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.637	0.605	0.564
Adjusted R^2	0.602	0.566	0.520
Residual Std. Error	1.758 (df = 814)	1.084 (df = 788)	1.560 (df = 764)
F Statistic	18.520*** (df = 77; 814)	15.674*** (df = 77; 788)	12.846*** (df = 77; 764)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 12 ROA: Interaction of Adaptability and Tightness

	Dependent variables:		
	ROA (2021) (T2)	ROA (2022) (T3)	ROA (2023) (T4)
Adaptability x Tightness	0.002	0.015**	0.001
	(0.003)	(0.005)	(0.003)
Adaptability	-0.002	0.057*	0.004
	(0.012)	(0.023)	(0.013)
Tightness	-0.015	-0.096***	-0.018
	(0.014)	(0.027)	(0.015)
Constant	0.003	-0.536***	-0.176*
	(0.064)	(0.125)	(0.071)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.370	0.262	0.346
Adjusted R^2	0.312	0.192	0.282
Residual Std. Error	0.071 (df = 816)	0.136 (df = 790)	0.074 (df = 766)
F Statistic	6.394*** (df = 75; 816)	3.745*** (df = 75; 790)	5.412*** (df = 75; 766)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 13 ROA: Interaction of Results-orientation and Tightness

	Dependent variables:		
	ROA (2021) (T2)	ROA (2022) (T3)	ROA (2023) (T4)
Results-orientation x Tightness	0.0001	0.023***	-0.0003
	(0.003)	(0.007)	(0.004)
Results-orientation	0.022	0.126***	0.018
	(0.015)	(0.029)	(0.016)
Tightness	-0.007	-0.091***	-0.011
	(0.011)	(0.020)	(0.011)
Constant	0.032	-0.522***	-0.149*
	(0.056)	(0.107)	(0.060)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.370	0.266	0.346
Adjusted R^2	0.312	0.197	0.282
Residual Std. Error	0.071 (df = 816)	0.135 (df = 790)	0.074 (df = 766)
F Statistic	6.386*** (df = 75; 816)	3.821*** (df = 75; 790)	5.409*** (df = 75; 766)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 14 Tobin's Q: Interaction of Results-orientation and Tightness

	Dependent variables:		
	Tobin's Q (2021) (T2)	Tobin's Q (2022) (T3)	Tobin's Q (2023) (T4)
Results-orientation x Tightness	0.105	0.057	0.163*
	(0.087)	(0.057)	(0.081)
Results-orientation	0.746*	0.456	1.033**
	(0.371)	(0.243)	(0.345)
Tightness	-0.352	-0.257	-0.649**
	(0.264)	(0.173)	(0.245)
Constant	-1.984	-0.824	-3.999**
	(1.397)	(0.919)	(1.323)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.626	0.551	0.523
Adjusted R^2	0.592	0.508	0.476
Residual Std. Error	1.781 (df = 816)	1.154 (df = 790)	1.630 (df = 766)
F Statistic	18.227*** (df = 75; 816)	12.926*** (df = 75; 790)	11.198*** (df = 75; 766)

Note: Predictors in this model were measured at T0. *p<0.05**p<0.01***p<0.001

TABLE 15 ROA: Interaction of Detail-orientation and Tightness

	Dependent variable:		
	ROA (2021) (T2)	ROA (2022) (T3)	ROA (2023) (T4)
Detail-orientation x Tightness	0.006*	0.011*	0.004
	(0.002)	(0.005)	(0.003)
Detail-orientation	0.031**	0.055**	0.025*
	(0.010)	(0.020)	(0.011)
Tightness	-0.019**	-0.049***	-0.021**
	(0.006)	(0.012)	(0.007)
Constant	-0.018	-0.363***	-0.191***
	(0.045)	(0.088)	(0.049)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.375	0.261	0.349
Adjusted R^2	0.317	0.190	0.285
Residual Std. Error	0.071 (df = 816)	0.136 (df = 790)	0.074 (df = 766)
F Statistic	6.517*** (df = 75; 816)	3.712*** (df = 75; 790)	5.467*** (df = 75; 766)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 16 ROA: Interaction of Integrity and Tightness

	Dependent variables:		
	ROA (2021) (T2)	ROA (2022) (T3)	ROA (2023) (T4)
Integrity x Tightness	0.0004	-0.015*	-0.002
	(0.003)	(0.007)	(0.004)
Integrity	0.013	-0.088**	-0.013
	(0.014)	(0.028)	(0.015)
Tightness	-0.008	0.018	-0.006
	(0.010)	(0.021)	(0.011)
Constant	0.029	-0.099	-0.129*
	(0.055)	(0.108)	(0.060)
Controls	Y	Y	Y
deIndustry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.370	0.260	0.346
Adjusted R^2	0.312	0.190	0.283
Residual Std. Error	0.071 (df = 816)	0.136 (df = 790)	0.074 (df = 766)
F Statistic	6.387*** (df = 75; 816)	3.708*** (df = 75; 790)	5.415*** (df = 75; 766)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 17 ROI: Interaction of Integrity and Tightness

	Dependent variables:		
	ROI (2021) (T2)	ROI (2022) (T3)	ROI (2023) (T4)
Integrity x Tightness	-0.028	-0.037*	-0.008
	(0.035)	(0.017)	(0.010)
Integrity	0.010	-0.131	-0.031
	(0.146)	(0.072)	(0.040)
Tightness	0.103	0.077	0.009
	(0.109)	(0.053)	(0.030)
Constant	0.570	-0.156	-0.099
	(0.571)	(0.278)	(0.158)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.036	0.138	0.139
Adjusted R^2	-0.053	0.056	0.055
Residual Std. Error	0.737 (df = 816)	0.350 (df = 790)	0.194 (df = 766)
F Statistic	0.401 (df = 75; 816)	1.690*** (df = 75; 790)	1.652*** (df = 75; 766)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 18 Tobin's Q: Interaction of Integrity and Tightness

	Dependent variables:		
	Tobin's Q (2021) (T2)	Tobin's Q (2022) (T3)	Tobin's Q (2023) (T4)
Integrity x Tightness	0.142	0.088	0.205*
	(0.085)	(0.057)	(0.081)
Integrity	0.532	0.412	0.831*
	(0.353)	(0.236)	(0.338)
Tightness	-0.466	-0.350*	-0.778**
	(0.262)	(0.175)	(0.250)
Constant	-2.405	-1.171	-4.490***
	(1.381)	(0.917)	(1.330)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.627	0.552	0.524
Adjusted R^2	0.593	0.509	0.478
Residual Std. Error	1.780 (df = 816)	1.153 (df = 790)	1.628 (df = 766)
F Statistic	18.276*** (df = 75; 816)	12.968*** (df = 75; 790)	11.262*** (df = 75; 766)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 19 ROA: Interaction of Collaboration and Tightness

	Dependent variables:		
	ROA (2021) (T2)	ROA (2022) (T3)	ROA (2023) (T4)
Collaboration x Tightness	0.001	0.021**	0.002
	(0.003)	(0.006)	(0.003)
Collaboration	-0.005	0.097***	-0.001
	(0.013)	(0.026)	(0.015)
Tightness	-0.009	-0.080***	-0.016
	(0.009)	(0.018)	(0.010)
Constant	0.025	-0.468***	-0.168**
	(0.050)	(0.098)	(0.055)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.370	0.266	0.346
Adjusted R^2	0.312	0.196	0.282
Residual Std. Error	0.071 (df = 816)	0.135 (df = 790)	0.074 (df = 766)
F Statistic	6.388*** (df = 75; 816)	3.808*** (df = 75; 790)	5.412*** (df = 75; 766)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 20 Tobin's Q: Interaction of Collaboration & Tightness

	Dependent variables:		
	Tobin's Q (2021) (T2)	Tobin's Q (2022) (T3)	Tobin's Q (2023) (T4)
Collaboration x Tightness	0.157*	0.061	0.175*
	(0.079)	(0.053)	(0.076)
Collaboration	0.456	0.166	0.509
	(0.329)	(0.223)	(0.319)
Tightness	-0.465*	-0.256	-0.644**
	(0.226)	(0.151)	(0.217)
Constant	-2.345	-0.783	-3.895**
	(1.263)	(0.840)	(1.219)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	892	866	842
R^2	0.627	0.551	0.524
Adjusted R^2	0.593	0.509	0.477
Residual Std. Error	1.778 (df = 816)	1.154 (df = 790)	1.629 (df = 766)
F Statistic	18.318*** (df = 75; 816)	12.936*** (df = 75; 790)	11.232*** (df = 75; 766)

Note: Predictors in this model were measured at T0. *p<0.05, **p<0.01, ***p<0.001

TABLE 21 Cluster Centroids from K-Means Analysis of Firm Culture Dimensions

Cultural Profiles	Standardized Means					
	Adaptability	**Results-orientation**	**Detail-orientation**	**Integrity**	**Collaboration**	**Tightness**
1	-0.07	-0.13	-0.10	-0.02	0.02	0.03
2	-1.21	-1.14	-0.92	-1.29	-1.20	0.04
3	0.91	0.94	0.76	0.88	0.76	-0.07

TABLE 22 Pattern Analysis Results: ROA

	Dependent variables:		
	ROA (2021) (T2)	ROA (2022) (T3)	ROA (2023) (T4)
Cultural Profile 2	-0.017*	-0.040**	-0.014
	(0.007)	(0.015)	(0.008)
Cultural Profile 3	0.006	0.002	-0.003
	(0.006)	(0.012)	(0.007)
Constant	0.113***	-0.016	-0.059
	(0.030)	(0.059)	(0.033)
Controls	Y	Y	Y
Industry Fixed Effects	Y	Y	Y
Observations	892	866	842
R^2	0.351	0.228	0.329
Adjusted R^2	0.295	0.161	0.268
Residual Std. Error	0.072 (df = 821)	0.138 (df = 795)	0.075 (df = 771)
F Statistic	6.336*** (df = 70; 821)	3.363*** (df = 70; 795)	5.395*** (df = 70; 771)

Note: *p<0.05, **p<0.01, ***p<0.001

TABLE 23 Pattern Analysis Results: Tobin's Q

	Dependent variables:		
	Tobin's Q (2021) (T2)	**Tobin's Q** (2022) (T3)	**Tobin's Q** (2023) (T4)
Cultural Profile 2	-0.154	-0.353**	-0.487**
	(0.183)	(0.122)	(0.177)
Cultural Profile 3	0.105	0.049	-0.010
	(0.154)	(0.101)	(0.145)
Constant	0.242	1.223*	-0.210
	(0.754)	(0.497)	(0.728)
Controls	Y	Y	Y
Industry Fixed Effects	Y	Y	Y
Observations	892	866	842
R^2	0.621	0.544	0.513
Adjusted R^2	0.589	0.504	0.468
Residual Std. Error	1.787 (df = 821)	1.159 (df = 795)	1.643 (df = 771)
F Statistic	19.241*** (df = 70; 821)	13.552*** (df = 70; 795)	11.585*** (df = 70; 771)

Note: *p<0.05, **p<0.01, ***p<0.001

TABLE 24 Pattern Analysis Results: ROI

	Dependent variable:		
	ROI (2021) (T2)	ROI (2022) (T3)	ROI (2023) (T4)
Cultural Profile 2	0.068	-0.094*	-0.014
	(0.075)	(0.037)	(0.021)
Cultural Profile 3	0.041	-0.010	0.006
	(0.064)	(0.031)	(0.017)
Constant	0.085	-0.165	-0.079
	(0.311)	(0.151)	(0.086)
Controls	Y	Y	Y
Industry Fixed Effects	Y	Y	Y
Observations	892	866	842
R^2	0.026	0.124	0.131
Adjusted R^2	-0.058	0.047	0.052
Residual Std. Error	0.739 (df = 821)	0.352 (df = 795)	0.194 (df = 771)
F Statistic	0.308 (df = 70; 821)	1.614** (df = 70; 795)	1.654** (df = 70; 771)

Note: *p<0.05, **p<0.01, ***p<0.001

TABLE 25 Change in Culture Dimensions as Predictors of ROA

	Dependent variables:		
	ROA (2021) (T2)	ROA (2022) (T3)	ROA (2023) (T4)
Δ Adaptability (T1-T0)	0.003	-0.001	-0.0001
	(0.004)	(0.005)	(0.004)
Δ Results-Orientation (T1-T0)	0.003	-0.003	0.002
	(0.003)	(0.004)	(0.003)
Δ Detail-Orientation (T1-T0)	0.002	0.004	0.001
	(0.002)	(0.002)	(0.002)
Δ Integrity (T1-T0)	0.002	0.003	0.002
	(0.004)	(0.005)	(0.004)
Δ Collaboration (T1-T0)	0.001	0.002	0.001
	(0.002)	(0.003)	(0.003)
Δ Tightness (T1-T0)	-0.0005	0.001	-0.0005
	(0.003)	(0.003)	(0.003)
Constant	0.035	-0.091*	-0.092*
	(0.037)	(0.046)	(0.038)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	667	644	631
R^2	0.364	0.323	0.316
Adjusted R^2	0.290	0.240	0.231
Residual Std. Error	0.071 (df = 596)	0.085 (df = 573)	0.069 (df = 560)
F Statistic	4.877*** (df = 70; 596)	3.906*** (df = 70; 573)	3.701*** (df = 70; 560)

Note: *p<0.05, **p<0.01, ***p<0.001

TABLE 26 Change in Culture Dimensions as Predictors of ROI

	Dependent variables:		
	ROI (2021) (T2)	ROI (2022) (T3)	ROI (2023) (T4)
Δ Adaptability (T1-T0)	0.006	-0.004	-0.005
	(0.012)	(0.010)	(0.009)
Δ Results-Orientation (T1-T0)	0.003	-0.00005	0.012
	(0.009)	(0.008)	(0.007)
Δ Detail-Orientation (T1-T0)	0.001	0.008	0.0001
	(0.005)	(0.005)	(0.004)
Δ Integrity (T1-T0)	-0.005	0.007	0.004
	(0.012)	(0.011)	(0.010)
Δ Collaboration (T1-T0)	-0.0003	-0.0005	-0.002
	(0.007)	(0.006)	(0.006)
Δ Tightness (T1-T0)	-0.008	-0.001	0.002
	(0.008)	(0.007)	(0.007)
Constant	-0.045	-0.277**	-0.216*
	(0.112)	(0.097)	(0.089)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	667	644	631
R^2	0.639	0.353	0.206
Adjusted R^2	0.597	0.274	0.107
Residual Std. Error	0.215 (df = 596)	0.180 (df = 573)	0.164 (df = 560)
F Statistic	15.089*** (df = 70; 596)	4.467*** (df = 70; 573)	2.077*** (df = 70; 560)

Note: *p<0.05, **p<0.01, ***p<0.001

TABLE 27 Change in Culture Dimensions as Predictors of Tobin's Q

	Dependent variables:		
	Tobin's Q (2021) (T2)	Tobin's Q (2022) (T3)	Tobin's Q (2023) (T4)
Δ Adaptability (T1-T0)	-0.140	-0.055	-0.074
	(0.099)	(0.065)	(0.086)
Δ Results-Orientation (T1-T0)	0.183*	0.070	0.075
	(0.080)	(0.052)	(0.069)
Δ Detail-Orientation (T1-T0)	0.043	0.040	0.031
	(0.046)	(0.030)	(0.040)
Δ Integrity (T1-T0)	-0.077	-0.006	-0.020
	(0.105)	(0.068)	(0.091)
Δ Collaboration (T1-T0)	-0.098	-0.056	-0.068
	(0.063)	(0.041)	(0.056)
Δ Tightness (T1-T0)	-0.005	-0.025	0.018
	(0.070)	(0.046)	(0.061)
Constant	-1.186	0.223	-1.463
	(0.948)	(0.625)	(0.832)
Controls	Y	Y	Y
Industry fixed effect	Y	Y	Y
Observations	667	644	631
R^2	0.614	0.538	0.517
Adjusted R^2	0.569	0.481	0.457
Residual Std. Error	1.817 (df = 596)	1.163 (df = 573)	1.535 (df = 560)
F Statistic	13.558*** (df = 70; 596)	9.527*** (df = 70; 573)	8.569*** (df = 70; 560)

Note: *p<0.05, **p<0.01, ***p<0.001

TABLE 28 Moderation Effect of Remote Work Feasibility on Relationship of Collaboration and ROI

	Dependent variable:
	ROI (2021)
Collaboration x Remote Work Feasibility	-0.300*
	(0.161)
Remote work feasibility	0.866
	(0.556)
Constant	-0.168
	(0.483)
Controls	Y
Industry fixed effects	Y
Observations	889
R^2	0.039
Adjusted R^2	-0.051
Residual Std. Error	0.738 (df = 812)
F Statistic	0.432 (df = 76; 812)

Note: *p<0.05, **p<0.01, ***p<0.001

FIGURE 1 ROA: Interaction of Adaptability and Integrity

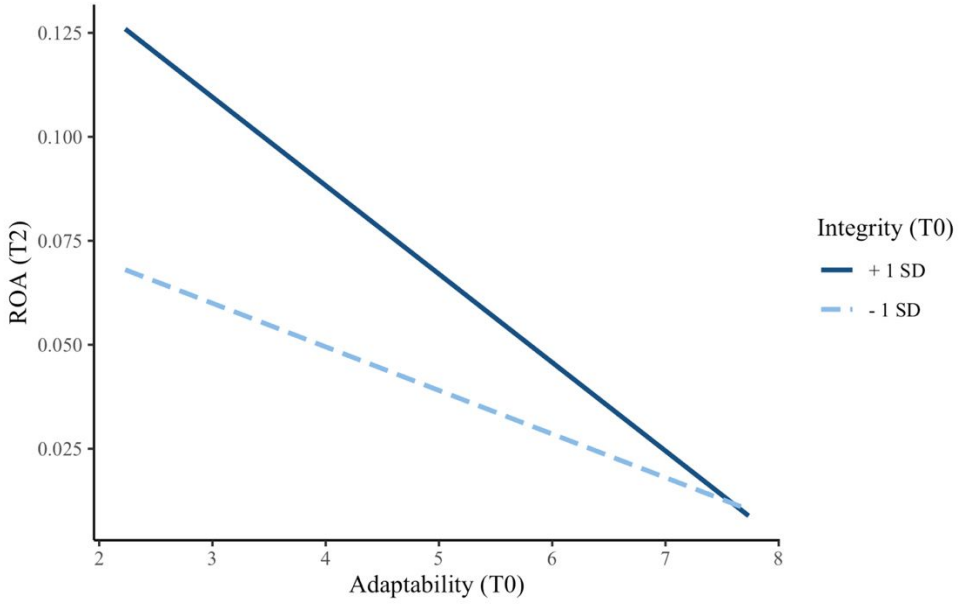
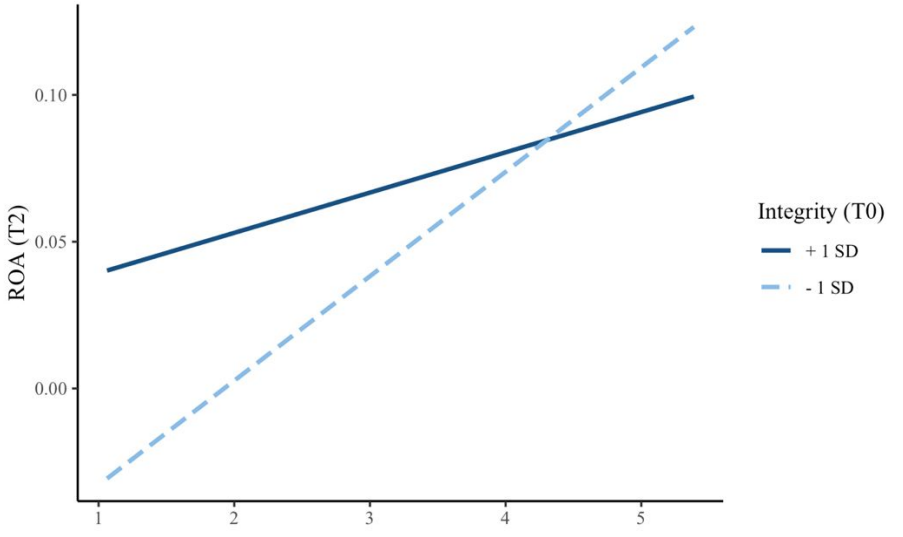
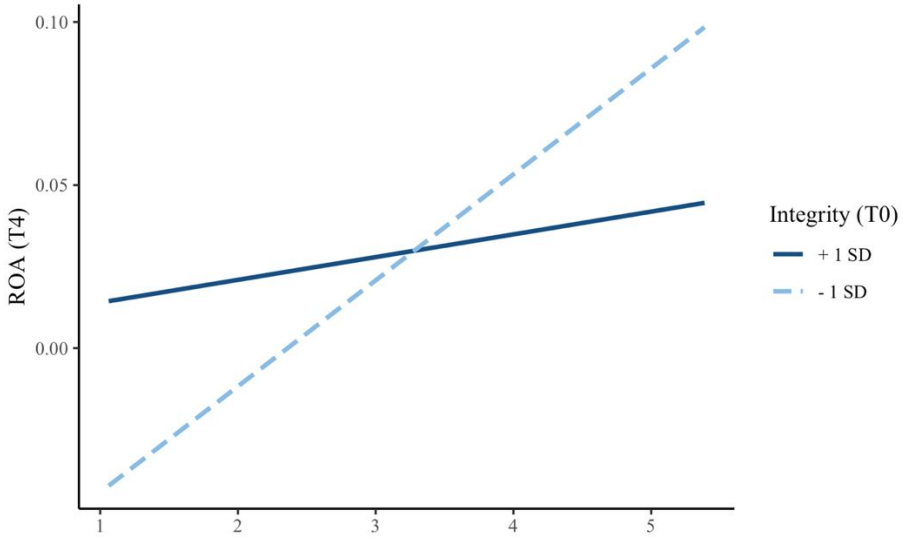


FIGURE 2 ROA: Interaction of Results-orientation and Integrity



Results-orientation (T0)



Results-orientation (T0)

FIGURE 3 ROA: Interaction of Collaboration and Detail-orientation

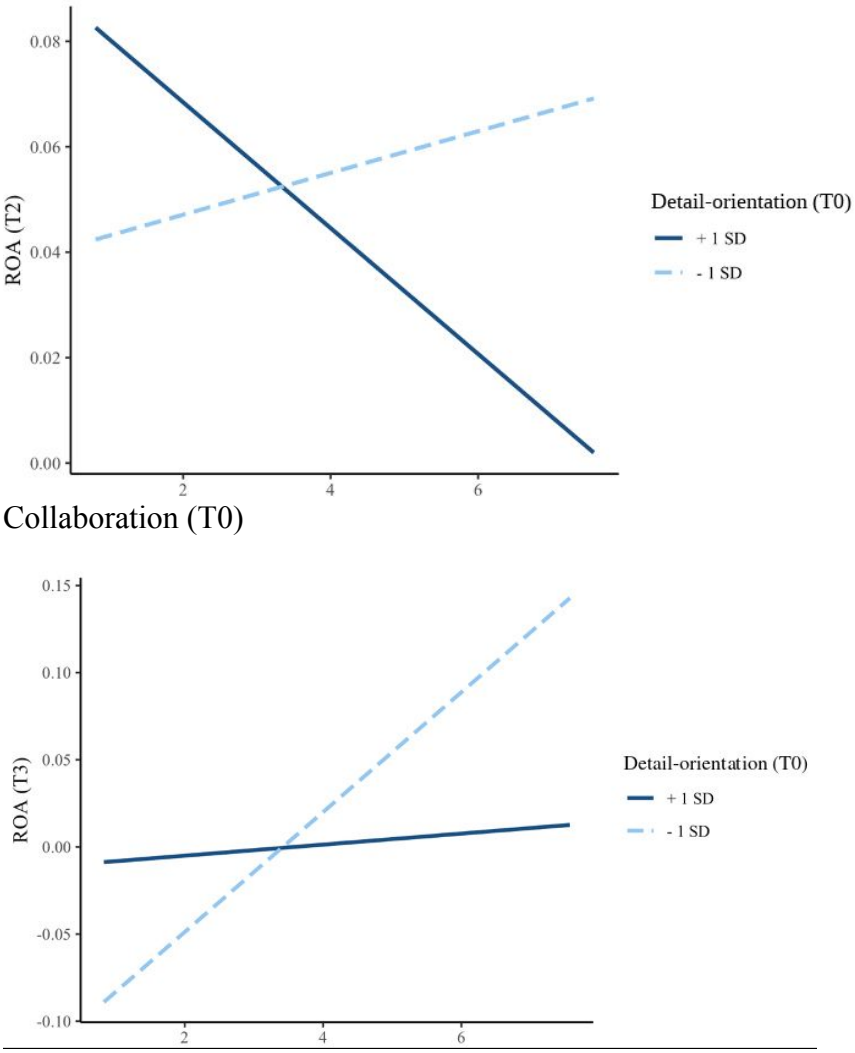
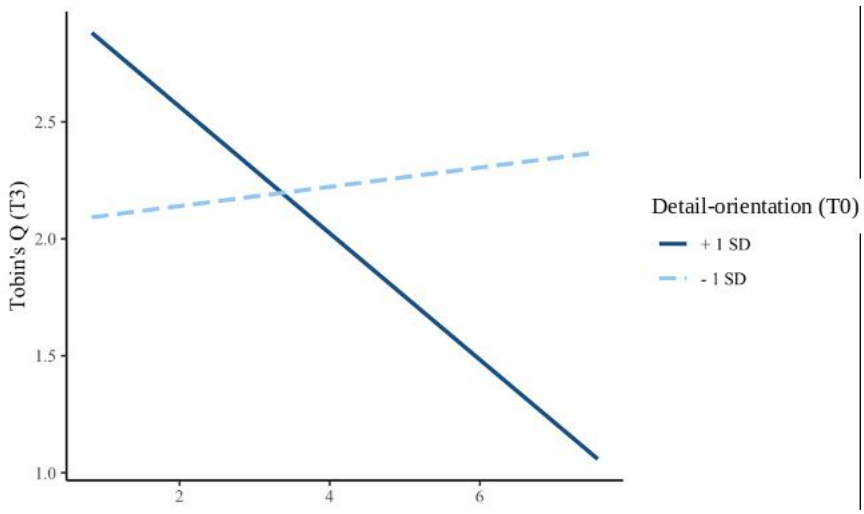
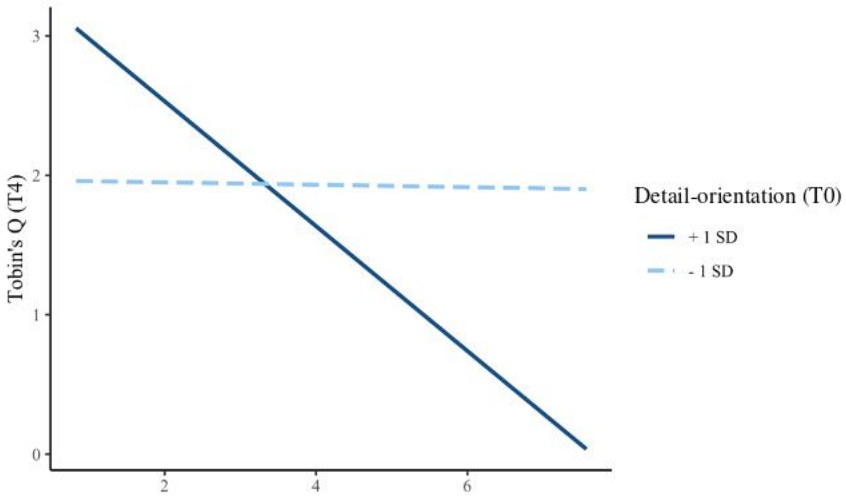


FIGURE 4 Tobin's Q: Interaction of Collaboration and Detail-orientation



Collaboration (T0)



Collaboration (T0)

FIGURE 5 ROA: Interaction of Adaptability and Tightness

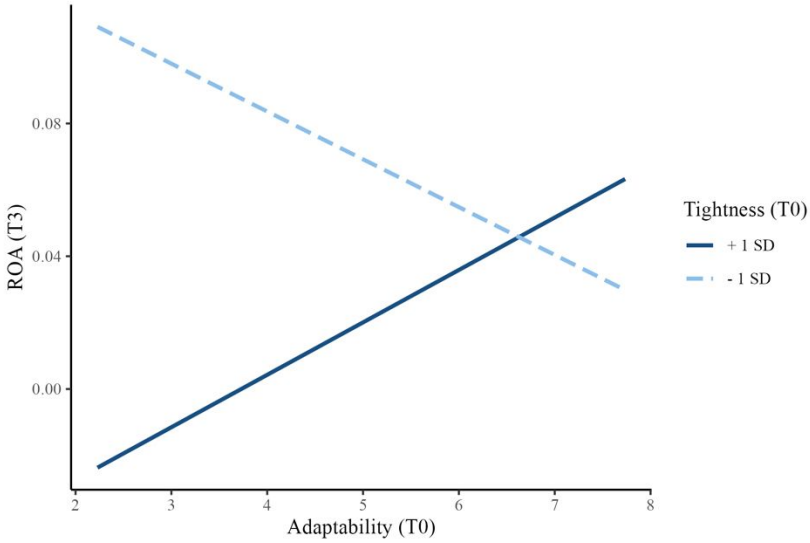
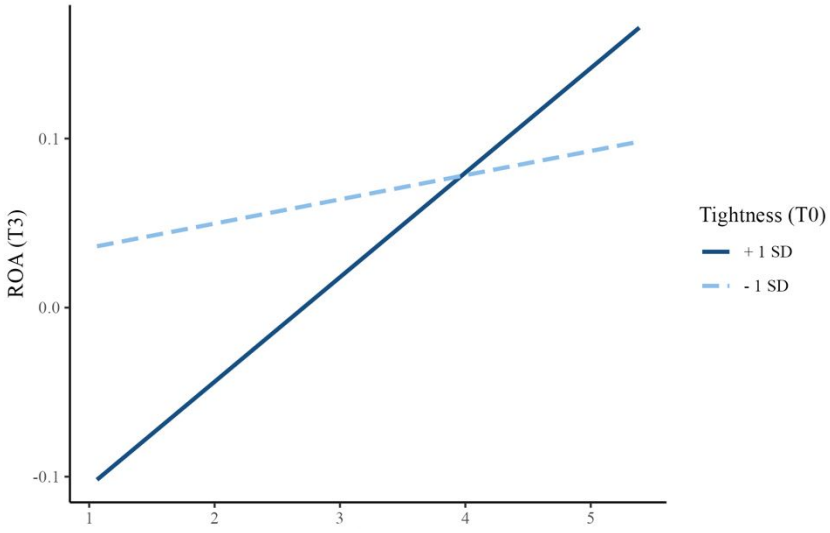
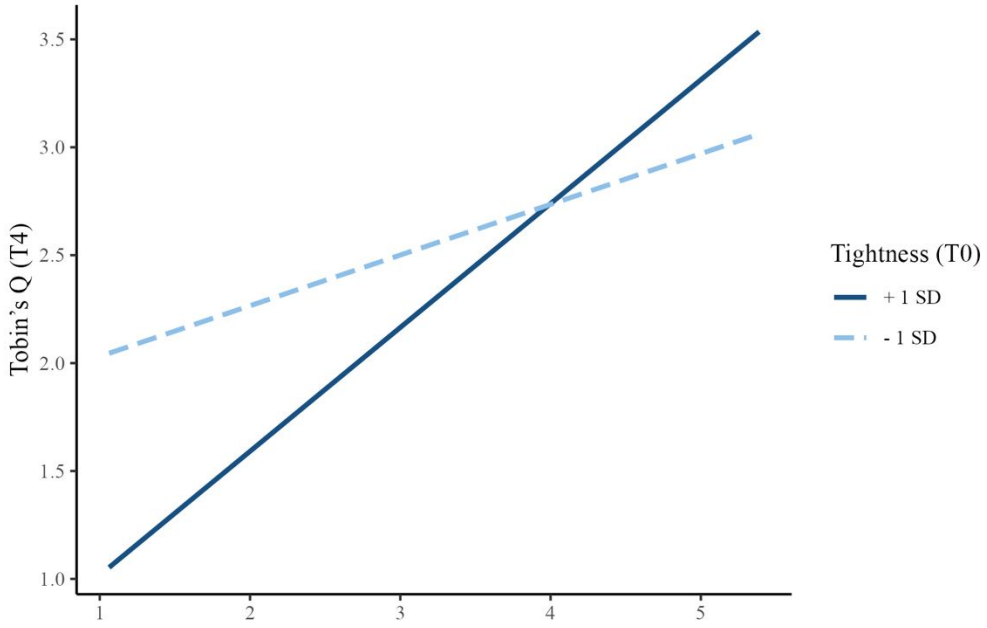


FIGURE 6 ROA: Interaction of Results-orientation and Tightness



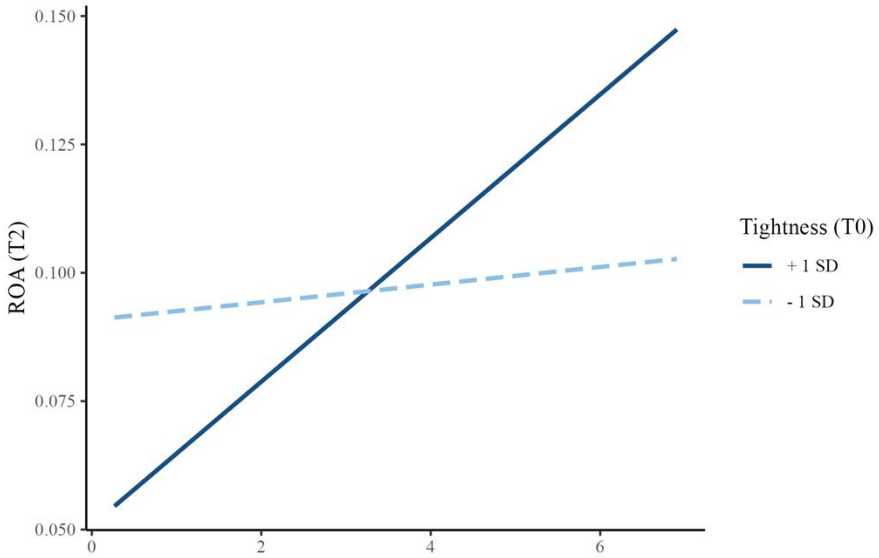
Results-orientation (T0)

FIGURE 7 Tobin's Q: Interaction of Results-orientation and Tightness

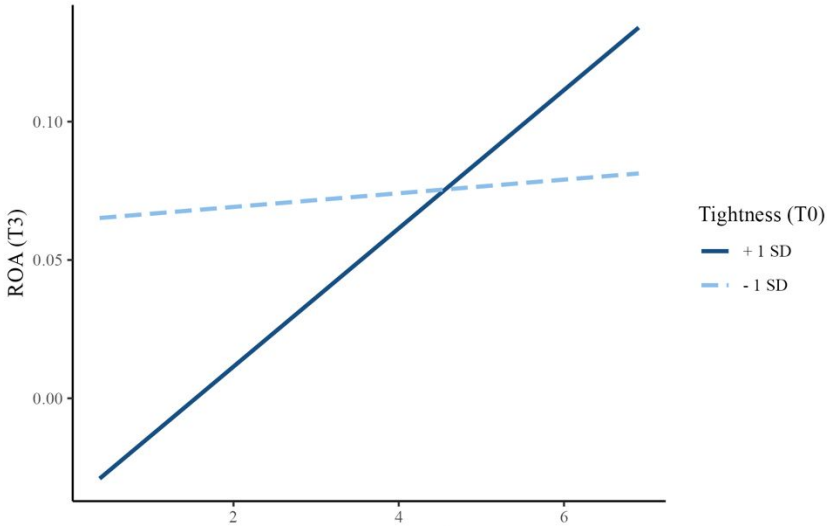


Results-orientation (T0)

FIGURE 8 ROA: Interaction of Detail-orientation and Tightness



Detail-orientation (T0)



Detail-orientation (T0)

FIGURE 9 ROA: Interaction of Integrity and Tightness

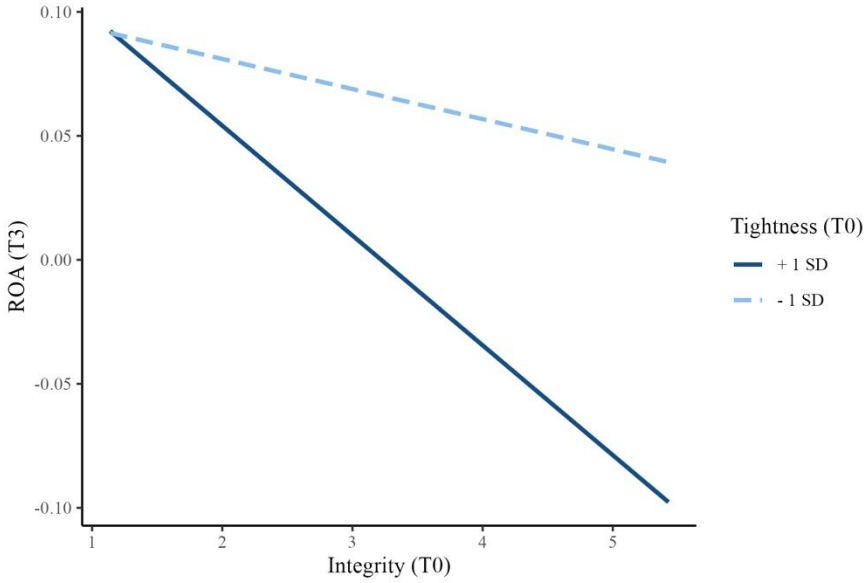


FIGURE 10 ROI: Interaction of Integrity and Tightness

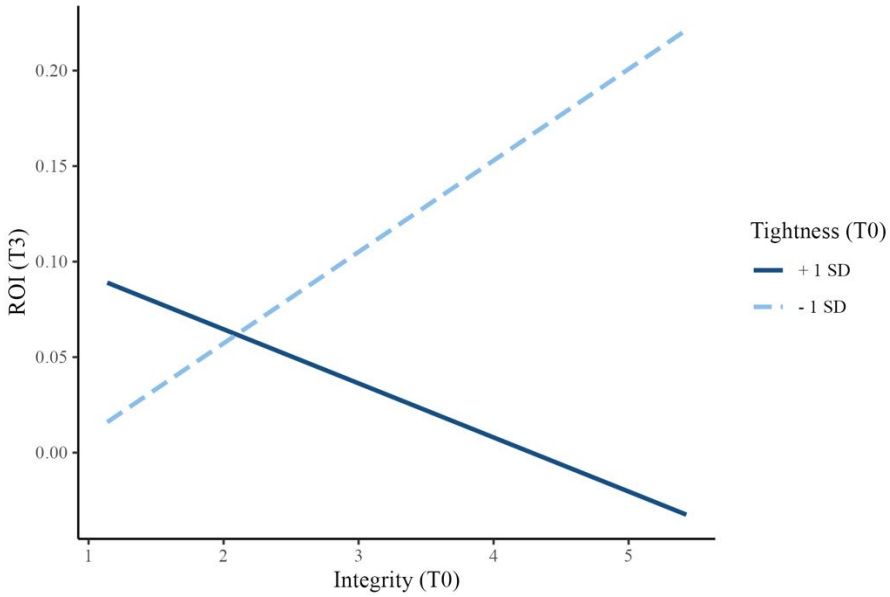


FIGURE 11 Tobin's Q: Interaction of Integrity and Tightness

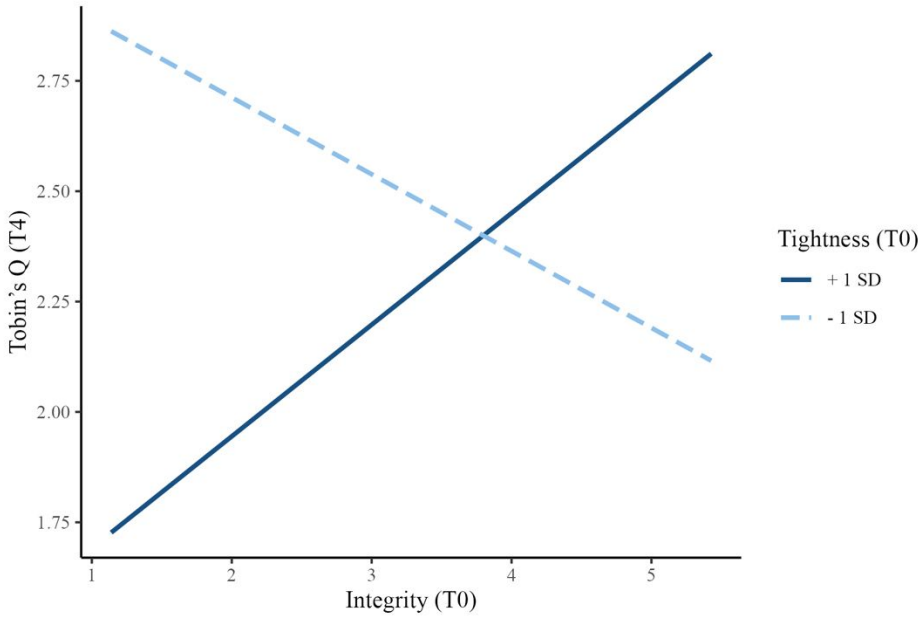


FIGURE 12 ROA: Interaction of Collaboration and Tightness

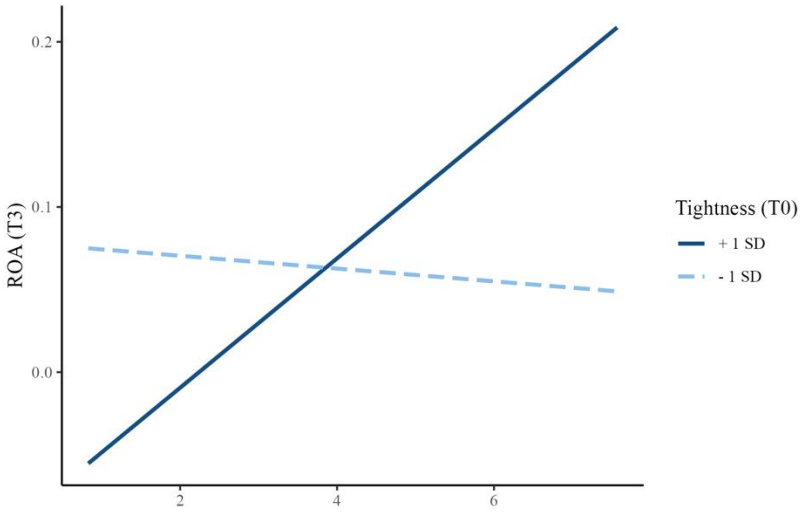
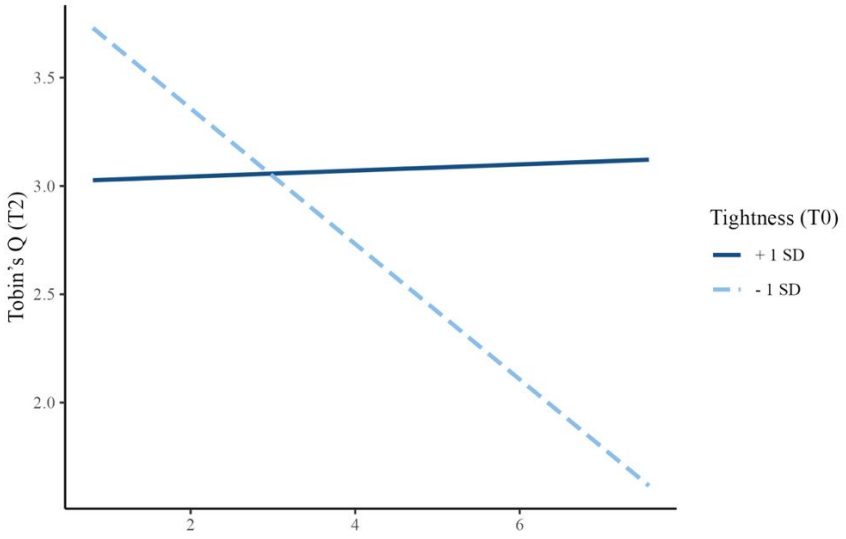
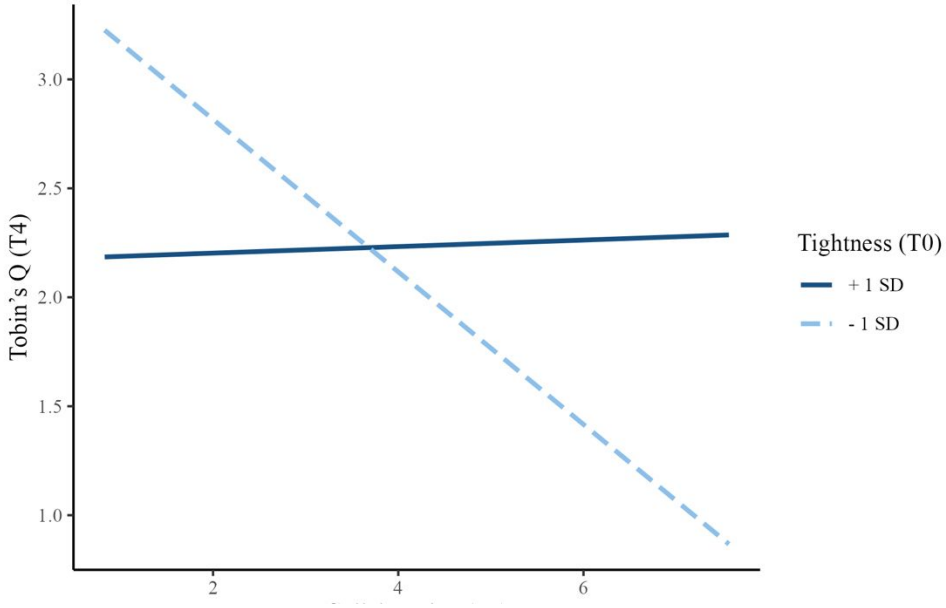


FIGURE 13 Tobin's Q: Interaction of Collaboration & Tightness



Collaboration (T0)



Collaboration (T0)

FIGURE 14 Comparative Visualization of Cultural Profiles for Pattern Analysis

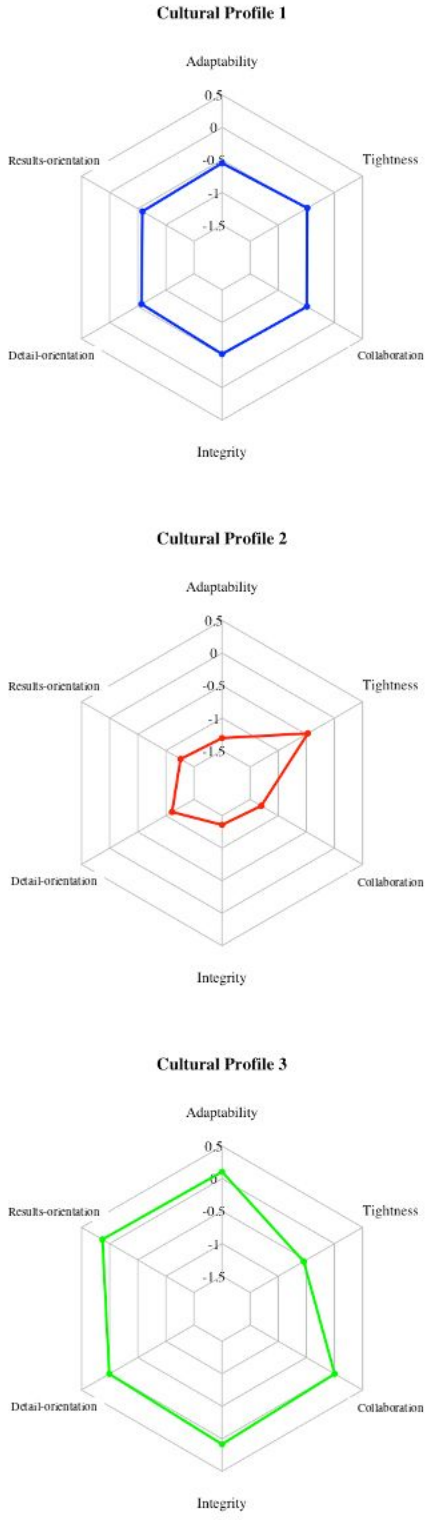
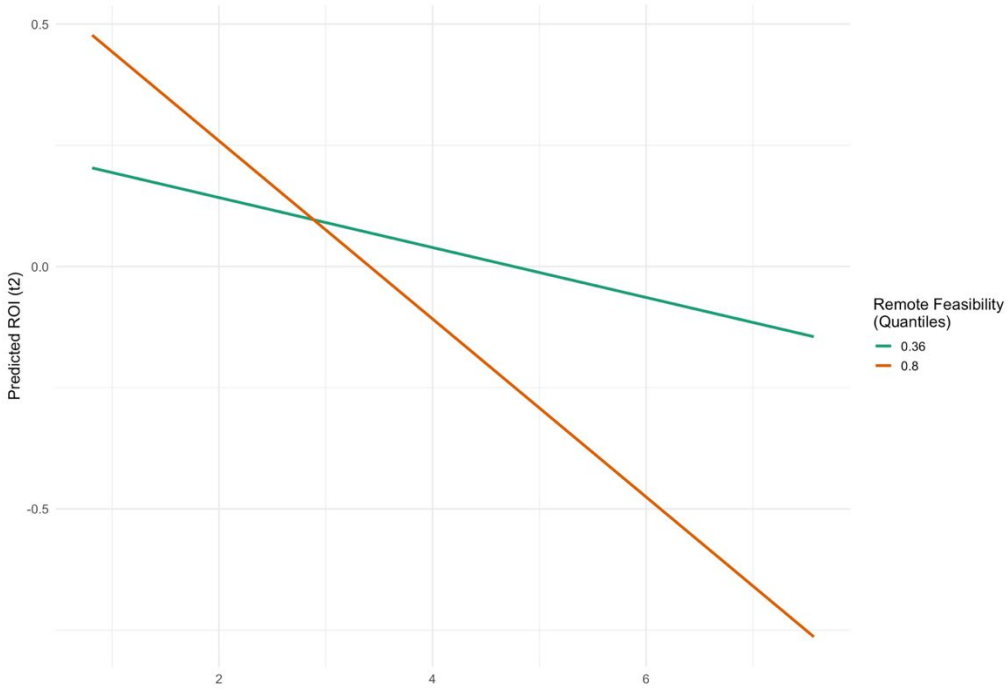


FIGURE 15 Interaction of Collaboration Culture and Remote Work Feasibility on ROI (2021)



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