Managerial Overconfidence and Dynamic Strategy-Structure (Mis-)Fit

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Abstract

I document a novel empirical puzzle in a representative sample of Canadian firms: Although strategy and structure are systematically aligned on average, competitive shocks seem to induce dynamic misalignment between strategy and structure. To understand this puzzle, I develop a theory of overconfident managers, who actively increase misalignment between strategy and structure in response to low-cost competition and test its predictions using representative panel data for all Canadian manufacturing firms in the wake of intensifying Chinese low-cost competition. The model is not only helpful in understanding overconfident responses, but also correctly predicts that very profitable and small firms rationally exhibit dynamic strategy-structure alignment in response to Chinese competition.

1 Introduction

An enduring idea in managerial sciences is that effectiveness of organizational choices is likely to depend on firm strategy, see Chandler, 1962; Milgrom and Roberts, 1995; Porter and Siggelkow, 2008. At the same time, this pursuit of internal fit among strategy and structure can give rise to issues of dynamic fit: internally consistent strategy-structure choices can be in conflict with adaptation to external competitive shocks. This paper is motivatived by an empirical puzzle. On the one hand, I find evidence that strategy and structure are systematically aligned on average. On the other hand, I also document that while firms shift their strategy in response to competition, they do not systematically restructure their organizations. In other words, despite strategy and structure being on average aligned, competitive shocks seem to imply dynamic misalignment between strategy and structure.

This "Dynamic Misalignment Puzzle" is established using China's WTO entry in 2002 as a natural experiment for a competitive shock for Canadian incumbents, and has the advantage of being large and salient, so failure to restructure is unlikely to be driven by the lack of high stakes, see Autor, Dorn and Hansen, 2013; Bloom, Draca and Van Reenen, 2015; Murray, 2016. My analysis is made possible by panel data on business strategy, organizational choices, and managerial perceptions representative for all Canadian business firms during the time period 1999 to 2006. Strategy is measured as relative importance of strategic exploration, compared to strategic exploitation. Exploration structure captures organizational practices emphasizing decentralization and importance of non-managerial initiative, as a variety of theoretical and empirical research[2] suggests such pratices are crucial to support exploration. I can therefore measure internal fit by quantifying how strongly strategy and structure are jointly oriented towards exploration or exploitation.

To understand the data better, I build a theoretical model of dynamic fit in the wake of intensifying competition, which clarifies the conditions that can lead to dynamic misalignment of strategy and structure. I follow a large literature in behavioral strategy (e.g. Powell, Lovallo and Fox, 2011, Picone, Dagnino and Mina, 2014), behavioral finance (e.g. Malmendier and Tate, 2015; Kent and Hirshleifer, 2015; Guenzel and Malmendier, 2020) and behavioral economics (Sandroni and

[2] See for example, theoretical arguments in Miles and Snow, 1978; Nickerson and Zenger, 2002; Boumgarten, Nickerson, Zenger, 2012 and empirical evidence in Yang, Kueng and Hong, 2015. I also provide separate empirical evidence that decentralization is systematically correlated with more radical innovations in the empirical section, even controlling for strategy.

Squintani, 2007; Ben-David, Graham, and Harvey, 2013; Grubb, 2015) and analyze managerial overconfidence as a key factor in this model. Managerial overconfidence is defined as the perception of managers that they are more productive in exploration-related tasks than non-managers, even though this perception might be incorrect. I then show that if this managerial overconfidence is embedded in the model, it predicts that overconfident managers will systematically centralize their organizations in response to competition, while shifting their strategy towards exploration. This prediction can help explain the puzzle: if some incumbents centralize and some incumbents decentralize in response to competition, it might seem as if there is no organizational response on average. To measure managerial overconfidence, I focus on firms with managers placing themselves to be "much better" than their main competitors (Taylor and Brown, 1988; Camerer and Lovallo, 1999; Kahnemann, 2011). Consistent with my model, I find that in response to intensifying Chinese competition, overconfident firms not only strategically reposition towards exploration, but at the same time restructure their organizations towards exploitation.

In other words, overconfident firms actively increase misalignment of strategy and structure. These results therefore suggests a new explanation for the classic question of why successful and seemingly well-managed firms struggle to adapt to intensifying competition. One widely held belief among managers and academics alike is that managerial overconfidence leads to complacency, which in turn explains why even successful firms have difficulties adapting. As Andrew Groves, the former CEO of Intel famously put it: "Success breeds complacency, complacency breeds failure (…) only the paranoid survive." (Groves, 1996).[3] Consequently, firms are prompted to strive towards a "bias for action" (Peters and Waterman, 1982). In contrast, my model and empirical analysis suggests managerial overconfidence leads to inconsistent actions, resulting in a dynamic misalignment of strategy and structure.

The model is also turns out to be helpful to understand conditions under which firms are likely to exhibit dynamic strategy-structure fit. This is especially the case for small firms and for very profitable firms, both of which are less likely to exhibit overconfident management. Indeed, very

[3] This hypothesis is shared by Doyle, 1995, who writes: "Often, the signs of an impending storm allow ample time for alert leadership to move an organization out of harm's way. Unfortunately, in more cases than not, those in positions of power are lured into complacency by successes of the past; they ignore the storm warnings, thinking it will pass or that their organizations will remain unscathed.". Similarly, Miller, 1992 states that "Stellar performers view the world through narrowing telescopes. One point of view takes over; one set of assumptions comes to dominate. The result is complacency and overconfidence."

small and profitable firms are moving strategy and structure jointly towards exploration in response to intensifying Chinese competition, consistent with a rational model of the complementarity of strategy and structure.

This paper contributes to at least two distinct literatures. First, it contributes to the literature on behavioral economics, behavioral finance and behavioral strategy, which has shown that overconfidence matters for a variety of areas such as risk-taking (Simon and Houghton, 2003 and Li and Tang, 2010), market entry (Camerer and Lovallo, 1999; Cain, Moore and Haran, 2015), innovation (Galasso and Simcoe, 2011; Hirshleifer, Low and Teoh, 2012), corporate social responsibility (Tang, Qian, Chen and Shen, 2015), learning from performance feedback (Chen, Grossland and Luo, 2015; Schumacher, Keck and Tang, 2019) and strategic positioning (Menon, 2018; Du, Meng. and Wu, 2019). Although studies, such as Li and Tang, 2010 have shown that managerial discretion moderates the impact of overconfidence on risk-taking, this paper is the first to analyze the impact of managerial overconfidence on organizational structure (including decentralized decision authority) itself while simultenously analyzing its impact on strategy.

Second, this study also contributes to the literature in strategic management and organizational economics on complementarity among management and organzational practices, pioneered by Milgrom and Roberts, 1990, Arora and Gambardella, 1994, Arora, 1996 and Athey and Stern, 1998. Recent empirical studies have shown the importance of complementarities among management practices, such as performance pay and worker empowerment (Ichniowski, Shaw and Prennushi, 1997), R&D and external knowledge acquisition (Cassiman, and Veugelers, 2006); IT capital and organizational structure (Bloom, Garicano, Sadun and Van Reenen, 2014); performance pay and task allocation (Hong, Kueng and Yang, 2019); performance monitoring and team-orientation (Blader, Gartenberg and Prat, 2019); and structured management and manufacturing process type (McElheran, Ohlmacher and Yang, 2020). This study complements this literature by analyzing strategy-structure complementarities in response to competitive shocks, which raises the question of dynamic fit. Neither of these phenomena have been analyzed in this literature before.

The remainer of the paper is structured as follows. Section 2 introduces the theoretical background and develops my formal model. Section 3 outlines the empirical background and discusses measurement and empirical specifications. Section 4 presents the results and section 5 adds a discussion of all results in context. Section 6 concludes.

2 Theory and Hypothesis Development

2.1 Managerial Overconfidence

Managerial overconfidence is one of the most prominent and well-documented behavioral biases in strategic management, finance and economics. Indeed, some authors, such as Kahnemann, 2011 argue that it is also potentially the most harmful decision bias.

Recent literature has shown that the type of overconfidence matters when analyzing different empirical applications, see Moore and Healy, 2008; Herz, Schunk and Zehner, 2014; Cain, Moore and Haran, 2015. Specifically, the literature distinguishes between three most common types of overconfidence. First, overprecision or miscalibration is defined as the tendency to be overly confident in the precision of predictions. This bias is especially pertinent to situations of forecasting and risk management, (Ben-David, Graham and Harvey, 2013) as well as learning from performance feedback, see Chen, Grossland and Luo, 2015. Second, overconfidence might take the form of overestimation, in which managers overestimate their own abilities or are excessively optimistic about future outcomes. This bias has been shown to drive overpayment in acquisitions (Hayward & Hambrick, 1997, Malmendier and Tate, 2008), corporate overinvestment out of internal cash-flow (Malmendier and Tate, 2005), muted risk-taking in response to performance feedback (Schumacher, Keck and Tang, 2019) and socially irresponsible corporate policies (Tang, Qian, Chen and Shen, 2015). However, overestimation is not always associated with bad performance outcomes and as it can drive higher levels of innovation, see Galasso and Simcoe, 2011; Hirshleifer, Low and Teoh, 2012; Herz, Schunk and Zehner, 2014.

The third most common type of overconfidence is overplacement, defined as tendency of respondents to overrate their skills, abilities and performance relative to others. This bias has been shown to be especially important in competitive situations, such as market entry decisions, see Camerer and Lovallo, 1999; Cain, Moore and Haran, 2015. This closeness of overplacement to perception of competition is one of the reasons this study focuses on this type of overconfidence. Additionally, as the theory below will show, overplacement of managers relative to non-managerial employees is crucial to understanding organizational choice decisions, while the same is not necessarily true for either overestimation or overprecision.

Two additional comments are instructive about the concept of overconfidence in the context of the literature. Although some empirical work has found that past success and media attention might

impact the degree of overconfidence, other work has found that overconfidence in competitive situations can be relatively stable, see Hayward, Forster, Sarasvathy, and Fredrickson, 2009. I will follow the latter approach and assume that overconfidence is a relatively stable character trait.

Furthermore, the behavioral strategy literature on overconfidence is naturally related to the upper echelons literature on managerial hubris, see Hayward & Hambrick, 1997 and Hiller and Hambrick, 2005. As pointed out by Schumacher, Keck and Tang 2019, managerial hubris includes not only overconfidence but is also intimately connected to the concept of "retribution", according to which "hubris is inevitably detrimental for an individual". Establishing such retribution effects in my context is equivalent to measuring bad performance outcomes in the wake of overconfidence. However, due to the nature of the exploration-exploitation trade-off, retribution might take much longer to establish for firm performance outcomes. As a consequence, this paper focuses much more on the narrower concept of overconfidence (in the form of overplacement) as opposed to the broader concept of managerial hubris.

2.2 Basic Model

I now develop a formal model of dynamic strategy-structure fit and managerial overconfidence for an incumbent firm responding to intensifying competition. The model builds on the literature on knowledge hierarchies, pioneered by Garicano, 2000 and subsequently applied to the context of complementary management practices by Bloom, Garicano, Sadun and Van Reenen, 2014 and Hong, Kueng and Yang, 2019[4].

Suppose there are two organizational layers $i = M, N$, where M denotes managers and N denotes non-managerial employees. Value creation requires firms to complete tasks, solve problems or make decisions, with tasks indexed by $z \in [0,1]$. Higher values of z capture more complex problems to be solved with the cdf of tasks being given by $F(z)$ with a density $f(z)$. Following Garicano, 2000, I assume that

$$f'(z) < 0 \tag{1}$$

In words, simple problems are more frequent (or "routine") while complex problems are rare (or "non-routine"). Garicano shows that one way to manage such a distribution of tasks with different complexities is "management by exception": non-managerial employees start with all problems

[4] Other applications include the impact of information and communication technologies on firm organization (Bloom, Garicano, Sadun, and Van Reenen, 2014), as well as the analysis of firm growth and occupational hierarchies (Caliendo, Monte, and Rossi-Hansberg, 2015).

and then communicate a problem up the organizational hierarchy at a cost h, if it is too complex for them to solve. In this way, managers can focus on the most complex problems, while non-managers specialize in completing simple tasks and communicate up more complex problems. This division of labor across managerial layers can be summarized as follows:

- Managers M solve tasks on problems with complexity $z \in [\delta, 1]$, with $\delta \in (0,1)$. The fraction of tasks solved by managers is therefore $1 - F(\delta)$
- Non-managers N solve problems with complexity $z \in [0, \delta)$, which implies a fraction of tasks solved by non-managers of $F(\delta)$.

The cutoff δ captures the degree of decentralized problem solving. Higher values of δ correspond to more complex and rarer problems being solved by non-managerial employees. As is standard in knowledge hierarchy models such as Bloom, Garicano, Sadun, and Van Reenen, 2014 and Hong, Kueng and Yang, 2019, increased decentralization implies a cost of $\kappa_D \cdot \delta$. At the same time, this type of task decentralization will correspond empirically to higher degrees of exploration in organizational structure. A classical argument holds that radical innovation and exploration require employee initiative, utilization of local information and flexible response to new information. All these factors can be more efficiently utIlized under a decentralized organizational structure, but this will typically come at the cost of weakened incentives and enforcement mechanisms for coordination. On the other hand, centralization is seen as promoting coordination, standardization and efficient attainment of quantitative goals such as cost-targets but often mutes decentralized information discovery and employee initiative. In other words, this classical view holds that higher degrees of decentralization support exploration, while lower degrees of decentralization support exploitation.[5] As a result, I will use the terms "decentralized problem solving" and "exploration structure" interchangeably.

To capture strategy, I introduce the variable $\sigma \in (0,1)$, which denotes the fraction of tasks that are used to support strategic exploration, while $(1 - \sigma)$ denotes the fraction of tasks used to support strategic exploitation. Higher values of σ capture stronger strategic positioning towards exploration and therefore greater emphasis on the expected net present value of exploration strategies $V^x(c)$. The value function $V^x(c) > 0$ in turn is assumed to be a function of the intensity

[5] These arguments are common to a variety of research literatures, such as contingency theory (Lawrence and Lorsch, 1967), configuration theory (Mintzberg, 1979; Miles and Snow, 1978; Friesen and Miller, 1984), transaction cost economics (Williamson, 1975) and agent-based simulation models (Rivkin and Siggelkow, 2003; Siggelkow and Levinthal, 2003) among others.

of competition c.[6] Similarly, the value function for strategic exploitation is given by $V^l(c) > 0$.[7] The formalization of strategy captured by $\sigma \in (0,1)$ builds on a strategic exploration-exploitation trade-off as postulated by March, 1991 and modeled by Holmstrom and Roberts, 1994. In latter study analyzes this trade-off as a form of "multi-tasking", which exploration as one task and exploitation as competing task. One potential conterargument for the existence of such a trade-off is the ability of firms to undertake investments in both exploration and exploitation simultaneously. However, managerial attention and time are limited, thereby necessarily imposing a trade-off between managerial inputs spent on exploration as opposed to exploitation. This point is summarized by Roberts, 2007: "(...), it really is not possible to eliminate the multi-tasking problem by assigning exploration to one group and exploitation to another. If the firm is going to both explore and exploit, someone will have to multi-task."

Since the focus of the model is strategic positioning by an incumbent firm, I assume that firms start with an exploitation strategy and repositioning towards exploration requires incumbents to incur a net repositioning cost given by $\frac{1}{2} \cdot \sigma^2$ (Menon, and Yao, 2017). This assumption is similar to models of product differentiation, where incumbents need to pay an adjustment cost to differentiate, see Makadok, and Ross, 2013 and Du, Meng. and Wu, 2019.

Once the strategy variable σ is chosen, managers and non-managerial employees exhibit different skills to solve problems associated with strategic exploration. Specifically, let a_M^x denote the productivity or skill with which managers solve problems under an exploration strategy, while a_N^x is the skill with which non-managers solve such problems. For simplicity I assume that the productivity for solving exploitation strategy problems is the same and given by a^l.

The overall net present value of the firm can be summarized as follows:

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[6] A simple way to provide a foundation for $V^x(c)$ is to start with flow profits $\pi(x; c)$, which depend on a vector of investments $x \in R^N$ into different projects with unknown probability distributions which can be learned by investments as in the multi-armed bandit literature. Additionally, flow profits would be influenced by the intensity of competition c, which might capture market entry, presence of substitute products or number of competitiors, depending on market structure and strategic interactions. Given a constant discount rate r, the value function can then be written as $V^x(c) = \max_{x_t} E_0[\sum_{t=0}^{\infty} \pi_t(x_t, c_t)]$, where E_0 is the prior belief on the distribution of payoffs across projects x.

[7] A foundation for $V^l(c)$ would start with flow profits $\pi(l; c)$, which depend on exploitation effort $l \geq 0$ and for which $\frac{\partial \pi(l;c)}{\partial\, l} > 0$ and $\frac{\partial^2 \pi(l;c)}{\partial l^2} < 0$, so exploitation efforts increase profits but at a diminishing rate. As before, c would capture competitive intensity, depending on market structure. Given a constant discount rate r, the value function for exploitation strategy could be written as $V^l(c) = \max_{l_t}[\sum_{t=0}^{\infty} \pi_t(l_t, c_t)]$.

$$W(\sigma,\delta;c) = \big(1-F(\delta)\big)\cdot[\sigma\cdot a_M^x\cdot V^x(c)+(1-\sigma)\cdot a^l\cdot V^l(c)\ -h] \tag{2}$$
$$+\ F(\delta)\cdot[\sigma\cdot a_N^x\cdot V^x(c)+(1-\sigma)\cdot a^l\cdot V^l(c)\ ]$$
$$-\kappa_D\cdot\delta-\frac{1}{2}\cdot\sigma^2$$

Taking the level of competition c as given, the incumbent firm will maximize expected net present value by optimally choosing strategy σ and structure δ.

2.3 Supermodularity

Since both strategy and structure are continuous variables, the characterization of supermodularity between strategy and structure can be expressed as the following cross partial derivative of (2):

$$\frac{\partial^2 W(\sigma,\delta,c)}{\partial\sigma\,\partial\delta} = f(\delta)\cdot V^x(c)\cdot[a_N^x-a_M^x] \tag{3}$$

It should be noted that in (3), the term $f(\delta)>0$, since it is a density and $V^x(c)>0$, since otherwise incumbent firms would not pursue any exploration strategy. As a result, the following condition applies

Supermodularity of Exploration Strategy and Structure. Exploration strategy and (decentralized) exploration structure are complementary, if exploration skills of non-managerial employees are more important for exploration than managerial skill, i.e. $a_N^x > a_M^x$

2.4 Strategy Structure Correlations

The optimal structure decision from (2) is given by

$$\delta^* = \varphi\left(\frac{\sigma\cdot V^x(c)\cdot[a_N^x-a_M^x]-h}{\kappa_D}\right) \tag{4}$$

where $\varphi(.)$ is a monotonically increasing function with $\varphi'(.)>0$. The correlation between strategy and structure can therefore be calculated by examining the impact of a strategy change on structure

$$\frac{\partial\delta^*}{\partial\sigma} = \varphi'\left(\frac{\sigma\cdot V^x(c)\cdot[a_N^x-a_M^x]-h}{\kappa_D}\right)\cdot\frac{V^x(c)}{\kappa_D}\cdot[a_N^x-a_M^x] \tag{5}$$

To evaluate (5), note that $\varphi'(.)>0$ and $\frac{V^x(c)}{\kappa_D}>0$, so that the strategy-structure correlation depends on the relative strength of non-managerial exploration skills a_N^x as opposed to managerial exploration skills a_M^x. Under the assumptions of supermodularity, given in 2.4, one should observe

a positive correlation of exploration strategy and structure.

Hypothesis 1*: If (exploration) strategy and (exploration) structure are complementary on average, they should be positively correlated. On average, firms pursue (internal) strategy-structure fit.*

2.5 Competitive Exploitation Shock and Dynamic Strategic Fit

I now move to the analysis of dynamic fit. Following the requirements of my normative framework in section 2.1, the focus on the dynamic fit analysis will be a competitive exploitation shock. Formally, this shock is defined as follows

$$\frac{\partial V^l(c)}{\partial c} < 0, \frac{\partial V^x(c)}{\partial c} > 0 \tag{6}$$

In words, in the case of a competitive exploitation shock, intensifying competition reduces the present value of exploitation strategies and increases the present value of exploration strategies. This is going to be the case for example if exploitation efforts increase firm profits through lower costs or higher firm productivity, while exploration efforts lead to the discovery of new products and services that increase product differentiation and therefore shield incumbent firms against competitive exploitation shocks. For empirical evidence on these different types of effects, see Roberts, 1999, while Makadok and Ross, 2013 and Yang, Li and Kueng, 2020 provide theoretical foundations.

To understand the predictions of this competitive exploitation shock for dynamic strategic fit, note that the optimal strategy decision from (2) is given by

$$\sigma^* = V^x(c) \cdot \left[\left(1 - F(\delta)\right) \cdot a_M^x + F(\delta) \cdot a_N^x\right] - V^l(c) \cdot a^l \tag{7}$$

Then, taking the derivative of the optimal strategy with respect to competition, one obtains

$$\frac{\partial \sigma^*}{\partial c} = \frac{\partial V^x(c)}{\partial c} \cdot \left[\left(1 - F(\delta)\right) \cdot a_M^x + F(\delta) \cdot a_N^x\right] - \frac{\partial V^l(c)}{\partial c} \cdot a^l \tag{8}$$

Equation (8) shows that given a competitive exploitation shock, defined by (6), firm strategy of incumbents will reposition towards exploration strategies, i.e. $\frac{\partial \sigma^*}{\partial c} > 0$. It should be noted that this prediction will hold, irrespective of the supermodularity condition in section 2.4, as long as employee skills contribute positively to problem solving, i.e. $a_N^x > 0,\ a_M^x > 0$.

***Hypothesis 2**: Competitive exploitation shocks induce firms on average to reposition towards exploration strategy.*

2.5.1 Competitive Exploitation Shock and Organizational Restructuring

Using (4) one can write the restructuring response to a competitive exploitation shock as

$$\frac{\partial \delta^*}{\partial c} = \varphi' \left(\frac{\sigma \cdot V^x(c) \cdot [a_N^x - a_M^x] - h}{\kappa_D} \right) \cdot \frac{\sigma}{\kappa_D} \cdot [a_N^x - a_M^x] \cdot \frac{\partial V^x(c)}{\partial c} \tag{9}$$

Where, as before, $\varphi'(.) > 0$ and $\frac{\partial V^x(c)}{\partial c} > 0$ as well as $\frac{\sigma}{\kappa_D} > 0$ as $\sigma > 0$. In other words, if $a_N^x \geq a_M^x$ as in the definition of supermodularity of strategy and structure, then (10) predicts that not only should strategic exploration and organizational decentralization be positively correlation, but in response to a competitive exploitation shock, strategy and structure should both move towards exploration.

***Hypothesis 3**: If strategic exploration and organizational decentralization are positively correlated, then competitive exploitation shocks induce firms on average to restructure towards decentralization and strategic exploration.*

2.5.2 Overconfidence and Dynamic Strategy-Structure Misfit

To capture overconfidence in the form of overplacement as discussed in section 2.2, I now allow managerial employees to misperceive their problem-solving skills for exploration strategies relative to the same skills for non-managerial employees. Denoting relative perceived problem-solving skills of managers relative to non-managers by a tilde above the variables, managerial overconfidence can be defined as

$$\tilde{a}_N^x < \tilde{a}_M^x \tag{10}$$

Using overconfidence (10) in the cross partial derivative (3), one can see that managerial overconfidence leads to a misperception of the underlying complementarity pattern. Importantly, an inspection of (3) also shows that overestimation alone is not sufficient to lead to a misperception of complementarity. Specifically, suppose a manager overestimates his own ability in exploration tasks $\tilde{a}_M^x = a_M^x + \xi$, with $\xi > 0$. If the manager also overestimates the ability of non-managers but

the same degree $\tilde{a}_N^x = a_N^x + \xi$, then the relevant difference $\tilde{a}_N^x - \tilde{a}_M^x = a_N^x - a_M^x > 0$ would remain unbiased. Therefore, overplacement, i.e. overestimation of managers' ability relative to non-managers' ability to solve exploration tasks is key in the context of organizational design choices.

In order for managerial overconfidence to matter for organizational restructuring, I also assume that managers have the authority to restructure the organization in response to competitive shocks. For many large corporations, extraordinary "emergency authorities" are often granted to "turnaround managers" or consultants, see Bolton and Dewatripont, 2012. For smaller firms, managers are likely to include firm owners, which have unconditional authority to restructure their firms.

Using (4) one can therefore write the restructuring response to a competitive exploitation shock as

$$\frac{\partial \delta^*}{\partial c} = \varphi'\left(\frac{\sigma \cdot V^x(c) \cdot [a_N^x - a_M^x] - h}{\kappa_D}\right) \cdot \frac{\sigma}{\kappa_D} \cdot [\tilde{\boldsymbol{a}}_N^x - \tilde{\boldsymbol{a}}_M^x] \cdot \frac{\partial V^x(c)}{\partial c} \tag{11}$$

where as before, $\varphi'(.) > 0$ and $\frac{\partial V^x(c)}{\partial c} > 0$ as well as $\frac{\sigma}{\kappa_D} > 0$ as $\sigma > 0$. Under these assumptions, managerial overconfidence (10) will reduce the optimal value of δ in response to a competitive exploitation shock, in other words it will lead to centralization of tasks at the managerial layer. Note that since managerial overconfidence in the form of the relative magnitude of $\tilde{a}_M^x$ relative to $\tilde{a}_N^x$ does not matter for the dynamic strategic response in (8), firms with overconfident managers will exhibit active dynamic misalignment: managers will reposition their firm more aggressively towards exploration strategies, while at the same time restructuring the organization towards exploitation.

Hypothesis 4*: Firms with overconfident managers restructure towards exploitation, (they centralize), in response to competitive exploitation shocks. This restructuring together with the strategic responses implies dynamic strategy-structure misfit.*

2.5.3 Strategy-Structure Response of Very Profitable Firms

Very profitable firms are a natural benchmark against which to compare firms with overconfident management, for least two reasons. On the one hand, their high profitability offers an objective

metric for the statement that firms might outperform their competition. This stands in contrast to merely subjective evaluations of being more profitable than competitors, which are likely to be impacted by overconfidence. Consequently, equation (9) would predict that very profitable firms will tend to decentralize their organizations in response to competitive exploitation shocks.

On the other hand, very profitable firms are likely to emphasize exploitation as opposed to exploration, as would be the case, if there is indeed an exploration-exploitation trade-off as argued by March, 1991. In the model, this results in very low values of the strategy variable σ. But this variable also enters the restructuring response to competitive exploitation shocks in (9), with values of $\sigma \approx 0$ suggesting that size of the effect of competitive exploitation shocks on restructuring might be smaller for very profitable firms. At the same time, very profitable firms, will reposition their strategy towards exploration in response to competitive exploitation shocks, as the level of σ does not enter (8). Therefore the empirical predictions for very profitable firms are:

Hypothesis 5*: Very profitable firms will reposition their strategy towards exploration in in response to competitive exploitation shocks. At the same time, they will restructure their organization towards exploration as well (they decentralize). However, restructuring effects will be small in magnitude.*

2.5.4 Strategy-Structure Response as Function of Firm Size

Large firms are another natural benchmark against which to compare overconfident firms, because firm size is an alternative metric for firm success, conditional on considering the same industry: firms can only sustain more employees if they are more productive or provide more value for customers. At the same time, it is plausible that competitive exploitation shocks, such as intensifying Chinese competition in the early 2000s open up opportunities for large firms that are otherwise not available. For example, empirical studies, such as Bena and Simintzi, 2019 and Branstetter, Chen, Glennon, and N. Zolas, 2021 have argued that increased Chinese trade offered North American firms the opportunity to more intensively outsource manufacturing to China. In this context, it is more likely that large firms benefit from such outsourcing than small firms, which

lack the scale to successfully implement outsourcing to China. Therefore, large firms might actually benefit in terms of the value of exploitation, or $\frac{\partial V^l(c)}{\partial c} > 0$ instead of $\frac{\partial V^l(c)}{\partial c} < 0$, as for smaller firms. As a result, the strategic response to intensifying Chinese competition can be described as

$$\frac{\partial \sigma^*}{\partial c} = \underbrace{\frac{\partial V^x(c)}{\partial c}}_{>0} \cdot \left[\left(1 - F(\delta)\right) \cdot a_M^x + F(\delta) \cdot a_N^x\right] - \underbrace{\frac{\partial V^l(c)}{\partial c}}_{>0} \cdot a^l \tag{13}$$

As a consequence of the ability to outsource and therefore increase the value of exploitation, large firms will reposition their strategy less towards exploration than small firms.

The restructuring response of large firms will not be affected by outsourcing opportunities, since the term $\frac{\partial V^l(c)}{\partial c}$ does not enter equation (9). At the same time, if firm size is a more objective proxy for competitive advantage than own evaluations, one would expect that large firms systematically restructure towards exploration in response to intensifying Chinese competition. The sign of this prediction would therefore be the same as the restructuring prediction for very profitable firms. However, we know from empirical work on CEOs of large, public US firms, that managers of large firms are more likely to attain media coverage, notoriety and awards and that such accolades often boost overconfidence (Malmendier and Tate, 2009). If large firms are more likely to have more award-winning or media-covered executives, then the prediction of (11) would be that large firms tend to centralize in response to intensifying competition. Therefore, empirical predictions for large firms can be summarized as follows:

Hypothesis 6a*: Very large firms will not reposition their strategy systematically towards exploration. At the same time, they will restructure their organization towards exploitation, if managers at large firms are more likely to be overconfident.*

A natural complement to these predictions for large firms are empirical predictions for how small firms respond to competitive shocks. Small firms are unlikely to be able to outsource to China and are less likely to have managers that are covered by the media. Therefore, small firms should be closer to the rational benchmark, which predicts that firms respond to competitive shocks by

moving strategy and structure jointly towards exploration.

Hypothesis 6b*: Small firms will respond to competitive exploitation shocks by jointly moving strategy and structure towards exploration and thereby preserve internal fit dynamically.*

3 Data, Natural Experiment and Measurement

3.1 Data

The source of my data is the Workplace and Employee Survey (WES), which is a random stratified sample of establishments with the universe of Canadian employer firms as the target population and was conducted by Statistics Canada. The survey targets establishments, which are locations of a business as opposed to firms, which can consist of multiple establishments. However, in the representative sample, almost 90 percent of firms are single-unit, so that I will use the terms establishment and firm interchangeably. Additionally, all of my empirical analysis will control for establishments that are part of multi-unit firms.

Firms are typically referred to as "workplace", since the initial design of the survey combined data on employers as well as a matched random sample of employee data. However, I do not have access to this employee data. The survey has a cross sectional dimension of approximately 6500 firms per year during the years 1999 to 2006. Since the sample gets replenished every year, so I end up with over 8,000 separate firms in the full sample. I also utilize sampling weights, which make the data representative for over 700,000 private employer firms in the Canadian economy. I focus on the sample of for-profit business firms. As in other government-sponsored surveys, response to the WES was mandatory, so that the overall response rate was typically close to 90%. The WES survey tool provides me with detailed information on business strategy, the internal organization of firms, and self-reported measures of innovative activity. The latter is not used directly in our construction of strategy and structure, but will be used to validate our measurement for the exploration-orientation of strategy and structure. I also utilize data on the firms' perceptions, as be explain in detail below.

3.2 Natural Experiment

The model of section 2 requires the analysis of a competitive exploitation shock. To proxy this

type of shock I use increased low-cost competition in the wake of China's WTO entry in 2002 as a natural experiment for a competitive shock that reduces the relative benefits of exploitation strategies compared to exploration strategies. The use of this competitive shock has several advantages in my setting. First, it has been well documented that the "China shock" was a large and salient competitive shock, which strongly intensified international competition for Canadian firms, see Murray, 2018 and Yang, Li and Kueng, 2020. Second, the nature of competition from China, i.e. the fact that is was predominately low-cost competition in the early 2000s, corresponds with the need of a competitive exploitation shock. Indeed low cost competition is likely to strongly reduce the benefits from increased exploitation through cost cutting and rationalizations, while it is likely to increase the value of product differentiation and strategic exploration. Third, since increased Chinese competition is driven by macroeconomic developments, such as China's entry into the WTO, Chinese entrants in North American markets can be considered to be a large mass of competitors. As a result, game theoretic considerations of entry are unlikely to matter much, thereby simplifying my empirical analysis.

3.3 Measurement

3.3.1 Measurement of Strategy

Every second year, the WES reports detailed information on business strategy. Within the survey the questions on strategy are placed between two topics. The preceding topic is "workplace performance", asking about revenues, costs and perceived improvement in productivity, profitability, customer satisfaction and product quality. The topics following the business strategy sections are destination markets and perceived competition, followed by innovation activities. The raw information on business strategy in the WES survey comes in the form of Likert-score responses to the question: "Please rate the following factors with respect to their relative importance in your workplace general business strategy". Responses vary from "Not applicable", scored at 1 and "Not important", scored at 2 to "Very important" and "Crucial", scored at 5 and 6 respectively.

I select the Likert scores on the responses "Undertaking research and development", "Developing new products/services", "Developing new production/operating techniques" to capture the intensity of exploration in strategic intentions. To combine these items, I de-mean all responses and create a strategy score that measures how intensively exploration is pursued, denoted S_r.

Similarly, for exploitation-orientation, I sum the de-meaned values of the responses "Reducing labor costs", "Reducing other operating costs", "Increasing product/service quality", and "Total quality management". I denote the resulting score S_l.

I have also confirmed that the de-meaning I use to remove any biases of respondents to consistently rate all strategies important or unimportant, does not affect my basic results. To measure the net strategic orientation towards exploration instead of exploitation, I combine the two strategic choice measures into a ratio of exploration to exploitation:

$$\sigma = S_r / S_l$$

Higher values of this "Explore-Exploit Ratio" σ denotes a stronger pursuit of exploration as opposed to exploitation in terms of strategic intent.

3.3.2 Measurement of Structure

My measurement of structure uses several measures to capture the general degree of decentralization in problem solving and therefore reliance of firms on non-managerial initiative. These measures include the practices of (1) decentralization of decision-making, which most closely mirrors the variable δ in my model, (2) use of stock compensation for all employees as a way to incentivize non-managerial employees to pursue exploration, see Holmstrom and Milgrom, 1994, (3) inter-firm R&D collaboration as measure of outsourcing and therefore reduction in centralization of managerial authority in innovation (Arora and Gambardella, 1994; Chesbrough, 2003) and (4) downsizing, which is related to increased centralization of tasks and cost-cutting as well as rationalization efforts, see Love and Nohria, 2005. I discuss the measurement of each of these components in the WES data in turn.

Decentralization of Decision Authority. The WES asks "who normally makes decisions with respect to the following activities?". The 12 possible responses in the survey include the tasks "daily work planning", "weekly work planning", "purchase of supplies", "equipment maintenance", "customer relations", "follow-up of results", "quality control", "training", "filling vacancies", "setting staffing levels", "product and service development" and "production technology choice". Among the possible responses to the question of who makes decisions, are the following "layers": 1) non-managerial employees, 2) work supervisors, 3) senior managers, 4)

individuals or groups outside the workplace (typically headquarters for multi-establishment firms), and 5) business owners. To measure decentralization, I take the sum of all decision that are exclusively decided by non-managerial employees.

Stock compensation. The WES data includes detailed information on the fraction of employees that receive stock compensation, including "employee stock purchase plans", "ownership plans" or "stock options". I therefore use the total percentage of employees with any form of stock compensation as my baseline measure for the use of exploration orientation of performance pay.

Inter-firm R&D collaboration. Firms in the WES are asked whether they pursue a "greater inter-firm collaboration in R&D", in the context of organizational changes. This is coded as a simple binary variable. Iinclude the value of this binary variable as measure of stronger exploration-orientation.

Downsizing. The practice of downsizing captures orientation towards exploitation and at the same time centralization of decision authority at managers. This is why it is included with a negative weight in my organizational exploration index. The WES asks whether respondents pursue downsizing in their organizational changes, defined as "reducing the number of employees on payroll to reduce expenses, it is part of a reorganization in the workplace and not simply a response to a drop in demand". This variable therefore should be interpreted as capturing "proactive downsizing" in the spirit of Love and Nohria, 2005 as opposed to "reactive downsizing", which is typically the result of low performance-induced cost cutting efforts.

Overall index. Although I will show the correlations of each of the structure components with strategy, I also use an overall index to measure organizational exploration. This index is based on a Principal Component Analysis (PCA), which is used to establish that the majority of the variation among these four variables are driven by one major latent factor with eigenvalue greater than one. I extract this factor as my organizational exploration index. Note that since 3 of the 4 underlying variables capture to come degree the continuum between decentralized problem solving and centralized (managerial) problem solving, this index is well suited to capture the variable δ in the model.

I provide descriptive statistics for both strategy and structure measures in table 1 for two samples. First, for my general analysis of hypotheses 1-2 I use the entire sample of all for-profit Canadian firms. Second for my analysis of how Canadian firms respond to Chinese low-cost competition, I use the subsample of manufacturing firms. Additionally, table 2 provides cross-correlations between my strategy and structure measures as well as my main control variables.

[Table 1, Table 2]

3.3.3 Measurement of Overconfidence

To measure managerial overconfidence, I use information about perceived competitive performance from the survey section following the business strategy questions. The specific survey question first asks the respondents to identify the number of "main competitors" and then asks "Compared to your main competitors, how would you rate your workplace performance?". The answers can rank from "Much worse" over "About the same" to "Much better". Following the psychology and behavioral economics literature on overconfidence as overplacement, (Taylor and Brown, 1988; Camerer and Lovallo, 1999; Kahnemann, 2011) I focus on on firms, which report that they are "much better" than their main competitors. It should also be noted in this context, that according to the Statistics Canada survey response protocol, senior managers were usually tracked down to answer this part of the survey. It is therefore reasonable to assume that this measured overconfidence is indicative of the senior manager in the firm. Furthermore, as an additional measurement condition, I assume that managerial overconfidence towards competitors is closely related to managerial overconfidence of managers relative to non-managerial employees. To the degree that both concepts are unrelated, the empirical analysis will be biased towards finding no impact of overconfidence on strategy and structure.

3.3.4 Additional Data

In this section I discuss additional data from the WES, which I use to either validate my strategy and structure measures or to test additional hypotheses.

The WES includes self-reported innovation data, which is the second topic after the "business strategy" section. The innovation section starts by asking respondents whether they have generated

one of the following four types of innovations in the past year, following the guidelines of the Oslo manual on how to measure innovation by the OCED. The four non-exclusive options are: first, "new products/services" defined as "products or services differ significantly in character or intended use from previously produced goods or services"; second, "new processes", defined as "the adoption of new methods of goods production or service delivery"; third, "improved products", defined as "those whose performance has been significantly enhanced or upgraded" and fourth, "improved processes", defined as "those whose performance has been significantly enhanced or upgraded". Additionally, the WES asks about how novel the "most important" innovation in terms of implementation costs is. Among the choices are "local market first", "Canadian first" and "World first".

Note that the use of this this self-reported innovation data has at least three distinct advantages. First, due to the fact that much of my sample captures not only large, public firms, but also younger and medium sized private firms, much of the innovation activity in our sample is likely to be protected by trade secrets instead of patents. As a result, using patenting is likely to be infeasible for purposes of accurately measuring innovation. Second, Yang, Li and Kueng, 2020 document that these self-reported innovation measures are systematically correlated with firm performance. In particular, product innovations are systematically correlated with accelerated firm growth while process innovations are systematically correlated with a slower operating cost growth. This confirms that these self-reported innovation measures are indeed likely to capture systematic information on innovation. Third, the distinctions between "new" products or processes as opposed to "improvements" as well as the degree of novelty of the most important innovation allows us to construct a measure of how radical innovations are. I am therefore able to validate my measures of exploration in strategy and structure with how radical and novel innovation outcomes are.

3.3.5 Econometric Specifications

This section gives an overview of the econometric specifications used to test hypotheses 1 to 6 from section 2. Hypothesis 1 captures the correlation between strategy and structure for the average firm, so I follow the logic of (5) and estimate equations of the form

$$\delta_{i,t} = \beta \cdot \sigma_{i,t} + controls_{i.t} \tag{14}$$

where hypothesis 1 predicts that $\beta > 0$, since both $\sigma_{i,t}$ and $\delta_{i,t}$ are constructed so that higher values capture more exploration orientation. Equation (14) will be estimated using pooled data and also firm fixed effects to control for permanent unobservable differences across firms.

Hypothesis 2 requires me to analyze the impact of Chinese competition on strategy. Measuring Chinese competition by the import penetration of 4-digit NAICS industry s at time t, denoted by $c_{s,t}$, I use regressions of the form

$$\sigma_{i,t} = \beta_1 \cdot c_{s,t} + D_i + controls_{i,s,t} \tag{15}$$
$$\delta_{i,t} = \beta_2 \cdot c_{s,t} + D_i + controls_{i,s,t}$$

in which D_i capture firm fixed effects, which I again include to control for potential selection effects and permanent unobserved differences across firms. Equation (15) allows me to test for the prediction of hypothesis 2 in equation (8) so, I would expect that $\beta_1 > 0$, if low-cost Chinese competition indeed captures a competitive exploitation shock.

For the last three hypothesis I will use an interaction regression, building on the logic of equation (8) and (9).

$$\sigma_{i,t} = \beta_1 \cdot c_{s,t} + \phi_1 \cdot x_{i,t} + \gamma_1 \cdot (c_{s,t} \times x_{i,t}) + D_i + controls_{i,s,t} \tag{13}$$
$$\delta_{i,t} = \beta_2 \cdot c_{s,t} + \phi_2 \cdot x_{i,t} + \gamma_2 \cdot (c_{s,t} \times x_{i,t}) + D_i + controls_{i,s,t}$$

in which $x_{i,t}$ captures either my measure of managerial overconfidence or a measure of firm profitability or firm size. For overconfident firms in hypothesis 3, one would expect that $\frac{\partial \sigma_{i,t}}{\partial c_{s,t}} = \beta_1 + \gamma_1 x_{i,t} > 0$ and $\frac{\partial \delta_{i,t}}{\partial c_{s,t}} = \beta_2 + \gamma_2 x_{i,t} < 0$. In contrast, hypothesis 5 would predict $\frac{\partial \sigma_{i,t}}{\partial c_{s,t}} = \beta_1 + \gamma_1 x_{i,t} > 0$ and $\frac{\partial \delta_{i,t}}{\partial c_{s,t}} = \beta_2 + \gamma_2 x_{i,t} \approx 0$ for very profitable firms, while hypothesis 6a would predict $\frac{\partial \sigma_{i,t}}{\partial c_{s,t}} = \beta_1 + \gamma_1 x_{i,t} \approx 0$ and $\frac{\partial \delta_{i,t}}{\partial c_{s,t}} = \beta_2 + \gamma_2 x_{i,t} < 0$ for very large firms. At the same time, hypothesis 6b predicts that $\frac{\partial \sigma_{i,t}}{\partial c_{s,t}} = \beta_1 + \gamma_1 x_{i,t} > 0$ and $\frac{\partial \delta_{i,t}}{\partial c_{s,t}} = \beta_2 + \gamma_2 x_{i,t} > 0$ for small firms.

4 Results

4.1 Validation of Strategy and Structure Measures

Both my measures of strategy and structure are constructed to measure net orientation towards exploration as opposed to exploitation. In this section, I validate this scoring, by relating my

strategy and structure measures to data on innovation outcomes. The logic of my validation exercise directly follows from the goal of exploration relative to exploitation: exploration seeks out novel opportunities and new ways of value creation, which should be associated with more radical innovations. If my measures of strategy and structure therefore correctly score the degree to which strategic and organizational choices emphasize exploration as opposed to exploitation, these scores should be systematically correlated with more radical innovations. As innovation outcomes, I consider an indicator for product innovations, an indicator process innovations and a discrete variable that has higher values the more novel the innovation is, with the top value being a "world first", the second value being "Canadian first", the third value being "local first", the fourth value being a "new" innovation and the lowest value being a "improvement" to products or processes.

[Table 3]

Table 3 shows the results of this validation exercise. The first three columns of table 3 show the correlation between innovation outcomes and strategy. Firms with a higher strategic priority of exploration relative to exploitation, systematically generate more product and process innovations. Additionally, they tend to generate more novel innovations as displayed in column 3. These patterns are consistent with the view that I indeed successfully capture strategic importance of exploration relative to exploitation. Columns 4 to 6 also confirm that higher organizational explorations scores are also strongly correlated with a higher likelihood of product and process innovations as well as innovation novelty.

The last three columns of table 3 investigate whether strategy and structure have independent variation that is systematically related to innovation, by including both variables in the innovation regressions. Our results in colums 7 to 9 indicate that strategy and structure have potentially separate impacts on innovation. Strategic orientation is plausbily more about strategy formulation and therefore intentions or plans by managers to shape and navigate value creation. In contast, organizational structure is plausibly more about the implementation of the formulated strategic direction by actually executing the generation of novel opportunities.

4.2 Strategy and Structure Correlations

Hypothesis 1 predicts a positive correlation of the exploration orientation of strategy and structure, for the average firm. Table 4 reports several regression specifications following this hypothesis.

[Table 4]

The first three columns report strategy-structure regressions for the pooled data, consistent with hypothesis 1 and equation (5), slowly building in a number of control variables. Our first set of variables control for firm size, as larger firms might tend to be more decentralized and able to use more stock compensation and might therefore be more exploration-oriented in their structure. In column 2 I then add a dummy for whether the establishment is unionized, as unionization might impete a company's ability to use performance pay or use downsizing as a tool to reduce slack and therefore increase exploitation. Column 3 then moves to include an indicator for whether firms are exporters, as exporting firms might tend to be more decentralized to be able to adapt better to international markets. Throughout all specifications the correlation between strategy and structure is positive and highly significant. In other words, firms with a stronger strategic emphasis on exploration also tend to systematically adopt organizational practices supporting exploration, irrespective of the effects of size, unionization or exporting.

These estimates are of course only correlational. In particular, there could be many potential omitted variables, such as managerial skill, company culture and other variables that might bias these OLS regressions. I investigate the importance of these types of omitted variables in column 4 of table 4, which includes a full set of establishment fixed effects to analyze whether strategic repositioning is correlated with restructuring on average. Consistent with hypothesis 1, I find that the strategy-structure relation holds up dynamically. Importantly, the coefficient on the strategy variable is very similar in magnitude with or without establishment fixed effects. This result is reassuring, since the establishment fixed effects control for a variety or selection biases or time-invariant omitted variables.

[Table 5]

This systematic relation between strategy and structure continues to hold if I analyze the four organizational practices separately. Table 5 gives an overview of strategy-structure regressions using one organizational variable at a time. These results show that the strategy-structure correlations hold, consistent with hypothesis 1, even for the constituent parts of the overall organizational structure index. At this point it should be noted that the results up to this point do neither suggest causality, nor a direction of impact, either from strategy to structure (as in Chandler, 1962) or from structure to strategy, (Csasar, 2013). Indeed, in the model of section 2, strategy and structure are simultaneously determined.

Following Kang, Kang and Kim, 2016, I therefore propose to use an instrumental variables approach that builds on the sociological insights on Flingstein, 1985. The idea is that peer effects can be an important determinant of strategic positioning choices, for two distinct reasons. First, similarity with peers may help to legitimize a firm's strategic choices towards external stakeholders as in Flingstein's theory of "mimetic isomorphism". Second, search costs and bounded rationality considerations as in March and Simon (1957) might suggest that similarity of strategic choices with peers can be a "satisfactory" choice. I construct peer effect measures by calculating the leave-out-mean of the strategy score for firms that are in the same location as measured by province as well as in the same industry as the focal firm. Sampling weights are very useful for these calculations, as they reweight these leave-out means to make them representative for the distribution of firms in these location and industry cells. I then use the average strategic explore-exploit ratio of peer firms to predict the strategy of the focal firm in the first stage and then regress structure of the focal firm on the instrumented strategy score in the second stage.

[Table 6]

Table 6 reports the first and second stages of this IV approach. I first note that my first stage is very strong and highly statistically significant, so that the instrument is clearly relevant and not weak. Additionally, it should be noted that I use a full set of location and industry fixed effects. These fixed effects ensure that sorting on location or industry is unlikely to drive my results. The second stage result in column 2 shows that the coefficient estimates remain with hypothesis 1. Furthermore, the IV estimate of the strategy coefficient is similar to the coefficient estimate under OLS or the establishment fixed effect regression. A natural omitted factor in the peer effects regression is the strength of local competition. Local competition might induce firms to decentralize and to shift strategic emphasis to exploration. I therefore control for a full set of establishment-level measures of perceived competition, which are 1-5 Likert scales of how intensively firms perceive competition from local, national Canadian, US and other international competitors. As the last column of table 6 shows, these additional control variables do not change the strategy-structure correlations much.

4.3 Dynamic Misalignment Puzzle

Following hypothesis 2, the first column of table 7 analyzes the impact of the competitive

exploitation shock in the form of intensifying Chinese competition on exploration strategy.

[Table 7]

The results are not only consistent with hypothesis 2, but a a variety of theoretical studies that suggest that firms might pursue exploration more intensively in an attempt to soften price competition and shield themselves from low-cost competition, see Shaked and Sutton, 1982; Knott, 2003. Indeed, March, 1991 argues that competition is likely to promote more exploration, thereby providing "powerful countervailing forces to the tendency for experience to eliminate exploration." However, most empirical studies of the effect of Chinese competition focus on overall innovation instead of analyzing exploration relative to exploitation, see Bloom, Draca and Van Reenen, 2013; Autor, Dorn, Hansen, Pisano, Shu, 2020.

Interestingly, the impact of Chinese competition on organizational structure in column 2 of table 7 is much weaker. Although the sign is positive and therefore consistent with increased restructuring towards organizational exploration, effects are not statistically significant. This result together with strategic repositioning implies dynamic misalignment between strategy and structure. This result is puzzling, since our results in section 4.2 suggested that strategy and structure are correctly aligned, both in the cross-section and in changes, but they seem to be misaligned in response to intensifying Chinese competition.

4.4 Results on Hypothesis 4 (Overconfidence)

Columns 3 and 4 of table 7 show the results for the analysis of firms with overconfident managers.

[Table 7]

To begin, note that the baseline effect of overconfidence is to increase the importance of exploration in both strategy and structure. This is consistent with previous evidence Galasso and Simcoe, 2011; Hirshleifer, Low and Teoh, 2012; Herz, Schunk and Zehner, 2014, who show how managerial overconfidence leads to higher levels of innovation and exploration. These results on the overconfidence main term are also consistent with the empirical work by by Simon and Houghton, 2003 and Li and Tang, 2010, showing that managerial overconfidence leads to increased risk-taking. These main term results are therefore reassuring that my measurement approach really captures managerial overconfidence.

Moving to the main hypothesis, one can then calculate the impact of Chinese competition on strategy by using the fact that the overconfidence measure is a dummy, which then implies for

strategy that $\frac{\partial \sigma_{i,t}}{\partial c_{s,t}} = 0.567 - 0.190 = 0.379 > 0$. This is consistent with hypothesis 2, even for overconfident firms, since the strategic response to a competitive exploitation shock in (5) does not depend on overconfidence. For hypothesis 4, a similar calculation applies to the last column of table 7, yielding $\frac{\partial \delta_{i,t}}{\partial c_{s,t}} = 0.149 - 0.957 = -0.808 < 0$. In words, in response to Chinese low-cost competition, Canadian firms with overconfident management tend to restructure their organizations systematically away from exploration. This result is consistent with the predictions of equation (10) and hypothesis 4.

An interesting feature of the results in table 7 is that the main correlations of overconfidence with strategy and structure suggest that overconfident firms are on average more strongly aligned towards exploration. However, at the same time, in response to competition, strategy and structure responses of overconfident firms imply active dynamic misalignment. The difference in these results can potentially be explained by the fact that strategy-structure correlations in (5) are driven by the level of the strategic value of exploration $V^x(c)$, which might be perceived to be low by managers, so decentralization might not be perceived as particularly costly to overconfident managers. In contrast, as shown in (11), the key for organizational restructuring in response to a competitive exploitation shock is the change in the value of exploration, $\frac{\partial V^x(c)}{\partial c}$. This change might be perceived to be very high, increasing from a very low base and therefore making organizational restructuring towards exploitation much more valuable for overconfident managers.

These results are potentially related to the classic question of why established firms fail to respond to disruptive innovation, see Henderson and Clark, 1990; Christensen, 1997. In particular, this evidence suggests that incumbent firms with overconfident management struggle to retain strategy-structure fit in response to low-cost competition. Part of the issue of responding to disruptive innovation, which starts out as low-cost competition and eventually leapfrogs the performance of market leaders, might be to manage a competitive response that retains strategy-structure fit along the exploration-exploitation margin.

4.5 Results on Hypothesis 5 (Very Profitable Firms)

Here I follow the hypothesis 5 and contrast the strategy-structure responses of overconfident firms with the responses of (objectively) very profitably firms.

[Table 8]

The first two columns of table 8 show how very profitable firms adapt to Chinese competition. As column 1 shows, high profitability firms systematically reposition their strategy towards exploration. This result is consistent with hypothesis 5 and equation (8), as the level of the strategic orientation σ does not enter (8).

At the same time, column 2 shows that very profitable firms restructure their organizations towards exploration, consistent with the view that they do exhibit overconfidence on average. It is worth noting that the restructuring response of very profitable firms is statistically insignificant. However, such an insignificant effect could be explained by the fact that the organizational response to competitive shocks in (9) depends on the level of the strategy variable σ, which is likely to be very low for firms with high current profitability. Indeed, strategic focus on high current profitability would be expected to lead to high current profitability under ideal circumstances. The results in the first two columns of table 8 are consistent with hypothesis 5 and can therefore be explained by a rational model rather than a model with overconfident managers. Furthermore, the contrast with overconfident firms suggests that the results of the overconfident firms are not driven by actually profitable firms.

4.6 Results on Hypothesis 6 (Firm Size)

The last two columns of table 8 contain results for hypothesis 6. To fully understand these results, note that the average firm size in the manufacturing sample population is 2.57 log points with a standard deviation is 1.2, according to table 1. Considering very large firms to be two standard deviations above the mean, the implied strategic response to Chinese competition is $\frac{\partial \sigma_{i,t}}{\partial c_{s,t}} = 1.005 - 0.177 \times 4.97 = 0.12 > 0$. This is a very weak and statistically insignificant response to Chinese competition, which is consistent with hypothesis 6a and the idea that the China shock is not necessarily a pure competitive exploitation shock for very large firms. Indeed, the ability to potentially outsource to China, is likely to offer opportunities to increase current profits for very large firms, rather than facing a profit reduction through more low-cost competition.

Additionally, the results in column 4 suggest that these very large firms do systematically restructure their organization: $\frac{\partial \delta_{i,t}}{\partial c_{s,t}} = 0.948 - 0.329 \times 4.97 = -0.69 < 0$. This result is exactly what hypothesis 6a predicted, if managers of large firms are more likely to be overconfident. Therefore, the effects of overconfidence are likely to be more general than just the sample of firms

for which one can measure overconfidence with survey data, such as the WES. These effects might also explain, why very large firms increase misalignment between strategy and structure in response to competitive shocks.

The same set of results can also be used to calculate the responses of very small firms, defined as firms that are two standard deviations below the mean. This allows me to offer results for the predictions for small firms in hypothesis 6b. For strategic responses, one obtains $\frac{\partial \sigma_{i,t}}{\partial c_{s,t}} = 1.005 - 0.177 \times 0.17 = 0.974$, while for restructuring responses one gets $\frac{\partial \delta_{i,t}}{\partial c_{s,t}} = 0.948 - 0.329 \times 0.17 = 0.892$. Both of these results are consistent with hypothesis 6b, which predicted that small firms will exhibit dynamic strategy-structure fit consistent with the baseline rational model. From the perspective of the model of section 2, this is because small firms are unlikely to benefit from outsourcing to China and are less likely to have overconfident managers.

5. Discussion

The empirical results on overconfident managers and managers of very large firms suggest that overconfidence enables managers to overcome organizational inertia. This is consistent with ideas expressed by Levinthal and March, 1993, who write that "One way of producing more exploratory behavior is through ignorance, through misperception of its risks. Successful organizations build a 'can do' attitude. (...) In situations in which risks must be taken in order to be successful, most overconfident individuals and organizations will undoubtedly perish to the risks they unwittingly face. (...) Overconfidence often leads to disaster, but in some situations organizations or populations of organizations profit from the individual foolishness that unwarranted self-confidence provides." In this context, it should be noted that this paragraph from Levinthal and March is consistent with several forms of overconfidence I discussed in section 2.1, such as overprecision, overestimation and overplacement. But as Herz, Schunk and Zehner, 2014 have shown, overprecision will typically reduce managers' pursuit of strategic exploration as underestimation of risk also implies little probability assigned to upside risk. On the other hand, both overestimation and overplacement might explain more aggressive pursuit of strategic exploration, either because managers overestimate the expected value of exploration (overestimation) or because they underestimate the capabilities of their competitors relative to their

own firm capabilities (overplacement).[8] Taken together, the evidence on large and overconfident firms suggest that managerial overconfidence is indeed potentially useful to overcome organizational inertia. However, it does so at the expense of dynamic internal fit. The more detailed analysis of adaptation responses to Chinese competition as function of firm types also provides an answer as to why firms on average seem to reposition their strategy but do not systematically restructure their organizations.

[Figure 1]

Figure 1, lists the strategy and organizational responses to Chinese competition, with upward arrows capturing adaptation towards exploration, while downward arrows capture changes towards exploitation. As the figure shows, in terms of strategic repositioning, all firm types except for the very largest firms consistently reposition their strategy towards exploration in response to low-cost Chinese competition. As a consequence the average repositioning response is increase strategic exploration. This stands in contrast to restructuring responses to Chinese competition. Here, only very small firms restructure towards exploration, while both, overconfident and very large (and also likely overconfident) firms systematically restructure towards exploitation. These opposing results for different firm types can therefore explain why the average organizational response to the competitive exploitation shock is not statistically significant.

6. Conclusion

This paper has developed and tested a formal model of dynamic strategy-structure fit in the face of managerial overconfidence. To my knowledge it is the first study to introduce behavioral biases into a model of dynamic strategy-structure of knowledge hierarchies following Garicano, 2000. The empirical evidence suggests that overconfidence can drive systematic strategy-structure misalignment in response to intensifying competition. The findings of this paper suggest several promising avenues for future research.

First, the perspective of this paper offers a potentially novel perspective on incumbent failure, especially in the context of disruptive innovation, see Henderson and Clark, 1990; Christensen, 1997. However, several important questions need to be answered to really understand the contribution of overconfidence to incumbent failure. Among these is the question of which types

[8] Note that for the overplacement result it is potentially important to allow managers to self-select into strategic exploration, as will be the case in the data, see Cain, Moore and Haran, 2015.

of overconfidence matter the most for incumbent failure – overprecision, overestimation or overplacement. Additionally, it is unclear whether overconfidence impacts firm responses differently, depending on different types of competitive shocks. For example, does overconfidence lead to different responses for competitive technology shocks, such as disruptive innovation as opposed to low-cost competition shocks? Relatedly, managerial overconfidence might take the form of complacency, leading to strategic inertia on the one hand and excessive activity on the other hand. Under which circumstances will overconfidence likely lead to one type of response rather than the other?

A second set of questions this study raises is what type of practices might be effective in countering – or "de-biasing" – managerial overconfidence. Recent evidence from studies such as Yang, Christensen, Bloom, Sadun and Rivkin, 2020 has shown wide and systematic variation in practices for strategy formalization, strategy development and strategy implementation. Which specific practices help to mitigate potentially harmful consequences of overconfidence, while possibly preserving the more beneficial effects, is an important question for future research.

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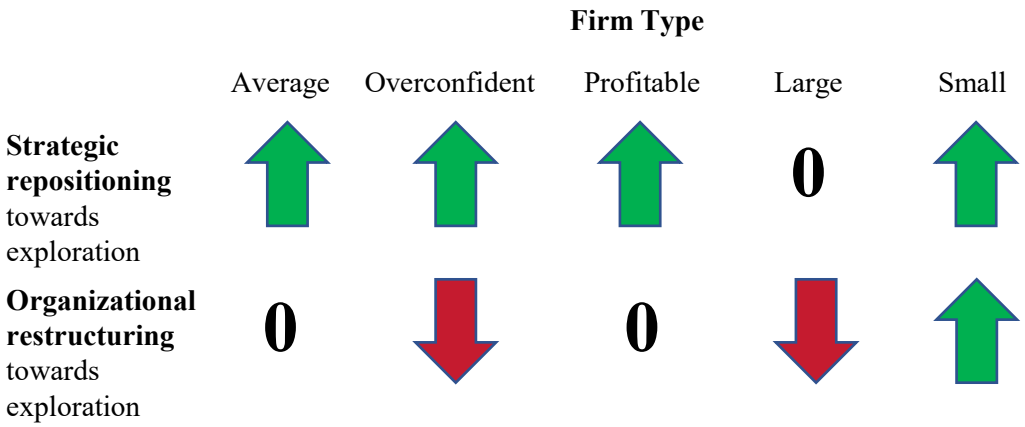

Figure 1: Overview of strategic repositioning and organizational restructuring responses to Chinese low-cost competition. Upward arrows denote positive and statistically significant effects, capturing more intensive pursuit of exploration. Downward arrows capture negative and statistically significant results, capturing more intensive pursuit of exploitation. Zeros capture statistically insignificant results.

Table 1: Descriptive Statistics

(A) Full sample (8,408 firms representing population of 723,787 firms)		
Variable	**Mean**	**Std. Dev.**
Strategy (Explore-exploit ratio)	1.28	0.45
Structure (Exploration orientation)	0.28	0.53
log size (employees)	1.99	0.97
Multi-unit firm	0.05	0.21
Unionized	0.10	0.30
Exporter	0.16	0.37
(B) Manufacturing sample (1,873 firms representing population of 59,402 firms)		
Strategy (Explore-exploit ratio)	1.26	0.42
Structure (Exploration orientation)	0.30	0.60
log size (employees)	2.57	1.20
Multi-uni firm	0.07	0.26
Unionized	0.14	0.34
Exporter	0.43	0.50

Notes: All summary statistics use sampling weights to make results representative. Strategy is captured by the "explore-exploit ratio", which is the ratio of the Likert-score on strategic exploration items (R&D, new products/services, new business processes) divided by the Likert-score on strategic exploitation items (lower labor or other operating costs, higher quality, TQM). Structure is the organizational exploration index, for which higher values correspond to more decentralization, more open innovation, more stock compensation for non-managerial employees and less downsizing.

Table 2: Raw correlations among main variables and controls

	Strategy (Explore-Exploit ratio)	Structure (Org. Exploration Score)	log size (employees)	Multi-unit firm	Unionized	Exporter
Strategy (Explore-Exploit ratio)	1					
Structure (Org. Exploration Score)	0.08	1.00				
log size (employees)	0.13	-0.06	1.00			
Multi-unit firm	0.16	-0.01	0.30	1.00		
Unionized	0.01	0.01	0.24	0.18	1.00	
Exporter	0.08	0.03	0.18	0.05	0.02	1

Notes: All summary statistics use sampling weights to make results representative. Number of sample firm obervations is 8,408, representing a population of 723,787 firms. Strategy is captured by the "explore-exploit ratio", which is the ratio of the Likert-score on strategic exploration items (R&D, new products/services, new business processes) divided by the Likert-score on strategic exploitation items (lower labor or other operating costs, higher quality, TQM). Structure is the organizational exploration index, for which higher values correspond to more decentralization, more open innovation, more stock compensation for non-managerial employees and less downsizing.

Table 3: Validation of strategy and structure with innovation outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Probit	Probit	Ordered probit	Probit	Probit	Ordered probit	Probit	Probit	Ordered probit
Dependent variable:	Product innovation	Process innovation	Innovation novelty	Product innovation	Process innovation	Innovation novelty	Product innovation	Process innovation	Innovation novelty
Strategy (Explore-Exploit Ratio)	0.333***	0.351***	0.289***				0.313***	0.331***	0.267***
	(0.046)	(0.045)	(0.037)				(0.046)	(0.046)	(0.037)
Structure (Org. Exploration)				0.202***	0.215***	0.216***	0.174***	0.187***	0.193***
				(0.038)	(0.042)	(0.032)	(0.039)	(0.042)	(0.032)
ln(total employees)	0.212***	0.242***	0.234***	0.183***	0.212***	0.207***	0.200***	0.229***	0.220***
	(0.023)	(0.022)	(0.020)	(0.023)	(0.022)	(0.020)	(0.024)	(0.022)	(0.020)
Multi-unit firm	0.052	0.038	-0.039	0.006	-0.014	-0.089	0.010	-0.006	-0.084
	(0.075)	(0.082)	(0.070)	(0.078)	(0.080)	(0.070)	(0.076)	(0.080)	(0.070)
Unionized	0.163**	0.091	0.135**	0.169**	0.099	0.141**	0.163**	0.091	0.136**
	(0.080)	(0.083)	(0.061)	(0.078)	(0.080)	(0.060)	(0.079)	(0.082)	(0.061)
Exporter	0.103	0.112*	0.195***	0.108	0.119*	0.195***	0.089	0.096	0.181***
	(0.067)	(0.063)	(0.057)	(0.066)	(0.061)	(0.057)	(0.066)	(0.062)	(0.057)
Industry fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Location fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	22,678	22,667	22,748	22,678	22,667	22,748	22,678	22,667	22,748
Number of establishments	8,408	8,408	8,408	8,408	8,408	8,408	8,408	8,408	8,408
pseudo R-squared	0.13	0.12	0.08	0.13	0.11	0.08	0.14	0.12	0.09

Notes: Standard errors in parentheses are clustered by industry-year. All regressions using WES data use sampling weights, which make results representative of 723,787 establishments. *** p<0.01, ** p<0.05, * p<0.1. Dependent variables are indicator for process or product innovation or novelty, defined as discrete variable ranging from 0 for "improvment" to 4 for "world first" innovation. Strategy is captured by the “explore-exploit ratio”, which is the ratio of the Likert-score on strategic exploration items (R&D, new products/services, new business processes) divided by the Likert-score on strategic exploitation items (lower labor or other operating costs, higher quality, TQM). Structure is the organizational exploration index, for which higher values correspond to more decentralization, more open innovation, more stock compensation for non-managerial employees and less downsizing.

Table 4: Strategy-Structure Regressions

	(1)	(2)	(3)	(4)
Dependent variable:				
Exploration Org. Structure Index	OLS	OLS	OLS	FE
Strategy (Explore-Exploit Ratio)	0.112***	0.112***	0.110***	0.098***
	(0.016)	(0.016)	(0.015)	(0.021)
ln(total employees)	0.073***	0.073***	0.069***	0.137***
	(0.009)	(0.009)	(0.009)	(0.030)
Multi-unit enterprise	0.234***	0.234***	0.234***	0.179
	(0.047)	(0.046)	(0.046)	(0.124)
Unionized		-0.004	-0.002	0.099**
		(0.029)	(0.029)	(0.045)
Exporter			0.067***	0.065**
			(0.020)	(0.028)
Industry fixed effects	YES	YES	YES	No
Location fixed effects	YES	YES	YES	No
Year fixed effects	YES	YES	YES	YES
Establishment fixed effects	No	No	No	YES
Observations	22,748	22,748	22,748	22,748
Number of establishments	8,408	8,408	8,408	8,408
Adj R-squared	0.13	0.13	0.14	0.26

Notes: Standard errors in parentheses are clustered by industry-year. All regressions using WES data use sampling weights, which make results representative of 723,787 establishments. *** p<0.01, ** p<0.05, * p<0.1 Strategy is captured by the "explore-exploit ratio", which is the ratio of the Likert-score on strategic exploration items (R&D, new products/services, new business processes) divided by the Likert-score on strategic exploitation items (lower labor or other operating costs, higher quality, TQM). Structure is the organizational exploration index, for which higher values correspond to more decentralization, more open innovation, more stock compensation for non-managerial employees and less downsizing.

Table 5: Strategy and Components of Structure Score

	(1)	(2)	(3)	(4)	(6)	(7)	(9)	(10)
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
Dependent variable:	Non-managerial employee control	Non-managerial employee control	Fraction of employees with stock compensation	Fraction of employees with stock compensation	Interfirm collaboration	Interfirm collaboration	Downsizing	Downsizing
Strategy (Explore-Exploit Ratio)	0.216***	0.196*	0.013***	0.008**	0.048***	0.031***	-0.013**	-0.023*
	(0.079)	(0.102)	(0.004)	(0.003)	(0.008)	(0.010)	(0.004)	(0.012)
ln(total employees)	0.161***	0.161	0.022***	-0.001	0.037***	0.049***	0.016**	-0.051**
	(0.054)	(0.164)	(0.003)	(0.005)	(0.004)	(0.014)	(0.004)	(0.021)
Multi-unit enterprise	-0.284**	-0.412	0.262***	0.136	0.038**	-0.078	0.030**	-0.045
	(0.140)	(0.319)	(0.033)	(0.115)	(0.018)	(0.063)	(0.012)	(0.050)
Unionized	0.021	0.309	0.003	0.028	-0.005	-0.010	0.009	-0.018
	(0.151)	(0.270)	(0.011)	(0.019)	(0.011)	(0.016)	(0.011)	(0.015)
Exporter	0.169	0.014	0.012*	0.012*	0.055***	0.045***	0.024	0.005
	(0.105)	(0.131)	(0.007)	(0.007)	(0.012)	(0.012)	(0.014)	(0.015)
Industry fixed effects	Y	N	Y	N	Y	N	Y	Y
Location fixed effects	Y	N	Y	N	Y	N	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Establishment fixed effects	N	Y	N	Y	N	Y	N	N
Observations	22,748	22,748	17,207	17,207	22,748	22,748	22,748	22,748
Number of establishments	8,408	8,408	8,408	8,408	8,408	8,408	8,408	8,408
Adj R-squared	0.12	0.28	0.25	0.53	0.11	0.24	0.04	0.16

Notes: Standard errors in parentheses, clustered by industry-year. All regressions using WES data use sampling weights, which make results representative of 723,787 establishments. *** p<0.01, ** p<0.05, * p<0.1. Non-managerial employee control are the number of tasks out of 14 possible tasks, typically only decided by non-managerial employees. Interfirm collaboration is an indicator for focal firm pursuing R&D collaboration with other firms. Downsizing is an indicator for firm proactively pursuing reduction in number of employees for more efficient performance instead of response to lower demand. Strategy is captured by the "explore-exploit ratio", which is the ratio of the Likert-score on strategic exploration items (R&D, new products/services, new business processes) divided by the Likert-score on strategic exploitation items (lower labor or other operating costs, higher quality, TQM).

Table 6: IV-Regressions of Strategy-Structure Peer Effects

Dependent variable: Organizational Exploration Score	(1) IV First Stage	(2) IV Second Stage	(3) IV First Stage	(4) IV Second Stage
Strategy (Explore-Exploit Ratio)		0.092**		0.096**
		(0.041)		(0.046)
Peer firm strategy (leave-out mean Explore-Exploit Ratio)	1.006***		1.009***	
	(0.018)		(0.021)	
ln(total employees)	-0.033***	0.069***	-0.030***	0.062***
	(0.008)	(0.009)	(0.009)	(0.009)
Multi-unit enterprise	-0.005	0.234***	-0.018	0.246***
	(0.025)	(0.045)	(0.027)	(0.046)
Unionized	0.006	-0.002	0.002	-0.010
	(0.027)	(0.029)	(0.028)	(0.031)
Exporter	0.054***	0.068***	0.029	0.047**
	(0.019)	(0.020)	(0.020)	(0.023)
Establishment-level perceived competition controls	No	No	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Location fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	22,731	22,731	20,196	20,196
R-squared	0.181	0.148	0.188	0.159
Number of establishments	8,408	8,408	8,408	8,408

Notes: Standard errors in parentheses are clustered by industry-year. All regressions using WES data use sampling weights, which make results representative of 723,787 establishments. *** p<0.01, ** p<0.05, * p<0.1. Strategy is captured by the "explore-exploit ratio", which is the ratio of the Likert-score on strategic exploration items (R&D, new products/services, new business processes) divided by the Likert-score on strategic exploitation items (lower labor or other operating costs, higher quality, TQM). Structure is the organizational exploration index, for which higher values correspond to more decentralization, more open innovation, more stock compensation for non-managerial employees and less downsizing. Peer firm strategy is given by the leave-out mean of the exploration-exploitation ratio of firms in the same industry and location as the focal firm. Establishment-level perceived competition include four Likert-Scores for perceived competition from local, national Canadian, US or other international competitors.

Table 7: Dynamic Misalignment Puzzle and Overconfidence

Dependent variable:	(1) Strategy Explore-exploit Ratio	(2) Structure Organizational Exploration Score	(3) Strategy Explore-exploit Ratio	(4) Structure Organizational Exploration Score
Chinese competition	0.548**	0.097	0.567**	0.149
	(0.251)	(0.321)	(0.261)	(0.316)
Overconfident Management			0.106**	0.161**
			(0.042)	(0.064)
Overconfident Management X Chinese competition			-0.190	-0.957**
			(0.348)	(0.486)
Firm Size	-0.006	0.072	-0.005	0.074
	(0.028)	(0.046)	(0.028)	(0.046)
Multi-unit enterprise	-0.056	-0.095	-0.059	-0.099
	(0.043)	(0.126)	(0.043)	(0.124)
Unionized	0.055	-0.349**	0.056	-0.347**
	(0.043)	(0.165)	(0.043)	(0.165)
Exporter	-0.002	0.114	-0.003	0.113
	(0.022)	(0.076)	(0.022)	(0.076)
Establishment Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,227	5,227	5,227	5,227
R-squared	0.006	0.081	0.010	0.084
Number of Establishments	1,873	1,873	1,873	1,873
Adj R-squared	0.00474	0.0800	0.00831	0.0824

Notes: Standard errors in parentheses, clustered by industry-year. All regressions using WES data use sampling weights, which make results representative of 59,402 manufacturing establishments. *** p<0.01, ** p<0.05, * p<0.1. Chinese competition is measured by Chinese import share. Overconfidence measured by an indicator is the respondent states that they perform "much better" than their main competitors. Firm Size is measured by log number of employees. Strategy is captured by the “explore-exploit ratio”, which is the ratio of the Likert-score on strategic exploration items (R&D, new products/services, new business processes) divided by the Likert-score on strategic exploitation items (lower labor or other operating costs, higher quality, TQM). Structure is the organizational exploration index, for which higher values correspond to more decentralization, more open innovation, more stock compensation for non-managerial employees and less downsizing.

Table 8: Profitability and Firm Size

Dependent variable:	(1) Strategy Explore-exploit Ratio	(2) Structure Organizational Exploration Score	(3) Strategy Explore-exploit Ratio	(4) Structure Organizational Exploration Score
Chinese competition	0.503**	0.092	1.005***	0.948**
	(0.207)	(0.331)	(0.291)	(0.468)
Profitability	-0.029	0.009		
	(0.048)	(0.056)		
Profitability X Chinese competition	0.708**	0.306		
	(0.338)	(0.545)		
Firm Size X Chinese competition			-0.177*	-0.329**
			(0.095)	(0.150)
Firm Size	-0.009	0.076	0.008	0.098
	(0.027)	(0.046)	(0.030)	(0.067)
Multi-unit enterprise	-0.055	-0.092	-0.057	-0.097
	(0.043)	(0.125)	(0.042)	(0.137)
Unionized	0.055	-0.351**	0.057	-0.346*
	(0.043)	(0.165)	(0.044)	(0.204)
Exporter	0.001	0.117	-0.000	0.117
	(0.022)	(0.077)	(0.022)	(0.092)
Establishment Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,219	5,219	5,227	5,227
R-squared	0.010	0.082	0.007	0.082
Number of Establishments	1,873	1,873	1,873	1,873
Adj R-squared	0.00784	0.0802	0.00533	0.0809

Notes: Standard errors in parentheses, clustered by industry-year. All regressions using WES data use sampling weights, which make results representative of 59,402 manufacturing establishments. *** p<0.01, ** p<0.05, * p<0.1. Chinese competition is measured by Chinese import share. Profitability is measured by operating margin. Firm size is measured by log number of employees. Strategy is captured by the "explore-exploit ratio", which is the ratio of the Likert-score on exploration items of strategy divided by the Likert-score on exploitation items for strategy. The Organizational Exploration Index measures strength of orientation of organizational elements towards exploration instead of exploitation.