Competition and Organizational Change*

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Abstract

We develop a model in which competitive pressure is a catalyst for organizational change. In our model, commitment to a narrow business strategy is valuable because workers need to coordinate their efforts to build a strategy-specific capability. We show that a monopolist may not be able to commit to a focused business strategy. However, introducing competition can make commitment credible, thus leading to organizational change and greater operating efficiency. Our model sheds light on a number of questions in the intersection between the strategic management literature and the organizational economics literature, including the importance of leadership styles, the interactions between strategic positioning and organizational capabilities and the existence of X-inefficiencies.

Keywords: Business Strategy, Competition, Capabilities, Organizational Change.

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1. Introduction

We develop a model in which competitive pressure can trigger organizational change. Our model shows that an increase in competitive pressure can either provide credibility to a firm's proposed strategy or render it obsolete. In either case, competitive pressure helps employees coordinate their efforts and implement changes to the organizational structure. These changes improve profitability by reducing costs and also by improving the firm's ability to compete.

The logic behind our model is as follows. Consider a firm that is an incumbent monopolist (or more generally, a firm with a competitive advantage) in markets A and B. At some future date, the incumbent has to decide whether to focus and operate only in A, or to remain diversified and operate in both A and B. If the firm chooses the focused strategy, its employees can coordinate their actions and undertake investments that are specific to market A. If a sufficiently large number of employees undertake such strategy-specific investments, the firm acquires a unique capability in A. However, employee coordination is achieved only if employees strongly believe that the firm will focus on A. If the firm is unable to commit to the focused strategy, employees may not wish to coordinate their actions. In that case, the firm does not operate at its efficient frontier; despite its monopoly rents, the firm forgoes some profits because of its inability to acquire a unique capability in A.

Suppose now that we introduce competition by allowing for potential entry in markets A and/or B. Potential entry has two effects. First, entry reduces or eliminates the incumbent's competitive advantage in market B, making the diversified strategy less attractive for the incumbent. Second, the threat of entry provides the incumbent with additional entry-deterrence incentives to focus on A. Both effects increase the likelihood that the incumbent will choose the focused strategy (that is, A). Employees then rationally choose to coordinate their actions around A. Because this coordination creates or enhances specific capabilities, the firm has a better chance of preventing entry in market A.[1]

[1] A similar account holds for the case in which the incumbent is initially focused, and then has the option

Our main contribution is the development of a theory linking competition and organizational change. This simple theory has many interesting implications. Here we briefly discuss three of them.

(1) *Strategic positioning and investment in firm capabilities are complements. They are both fostered by competition.*

In our model, commitment to a focused strategy leads to more investment in strategy-specific capabilities, which in turn strengthens the firm's strategic position. More intense competition—in the sense of potential entry by competitors—reinforces the credibility of a firm's strategic position and creates incentives for investments in capabilities.

(2) *Monopolies do not necessarily operate at the frontier of production possibilities. Competition can increase productive efficiency.*

In neoclassical economics, monopolies are inefficient only because they produce too little; they still operate at their efficient technological frontiers and thus minimize costs. However, monopolies in the real world are often perceived as inefficient, bureaucratic structures. The failure to minimize costs for a given level of output is often referred to as "X-inefficiencies" (Leibenstein, 1966).

In light of the discussion following Leibenstein's work, it has been questioned whether X-inefficiencies can really exist (Stigler, 1976). We add to this discussion by proposing a possible mechanism that generates X-inefficiencies endogenously, without resorting to usual explanations such as private benefit consumption by managers, bounded rationality, or social norms. In our model, monopolies may not minimize costs due to their inability to commit to a focused strategy, which then creates coordination frictions.

(3) *Incumbent's profits may increase with the threat of entry in the industry.*

This seemingly counter-intuitive result is easily understood once one considers the commitment effect of competition. More competition can eventually solve the dynamic inconsistency problem associated with the choice of business strategies. When it does, the firm is

to diversify or to remain focused.

better off due to the positive effects of competition on capability building and entry prevention.

We also use our model to analyze the importance of different leadership styles. The economic literature on business leadership often defines "visionary leadership" as the ability to commit to a strategy [for a survey of the most recent literature, see Bolton, Brunnermeier, and Veldkamp (2010)]. In line with some previous works, we consider the choice between a flexible (or ex post profit-maximizing) and a committed (or visionary) CEO. We find that committed CEOs are necessary to implement focused strategies that are promising but risky. We also show that the ability to commit is a less important managerial trait in very competitive environments. The reason for this result is that the threat of competition always commits the firm to the most profitable strategy.

A Motivating Example. Although our model is not inspired by any particular company, its ingredients and many of the conclusions can be motivated by, and are consistent with, the case of Intel Corporation and the choices it faced in 1984-85 (see Burgelman, 1994).[2] Before its exit from the dynamic random access memory (DRAM) business in 1985, Intel was an active player in both the market for DRAMs and the market for microprocessors. Intel pioneered both products and, even though the production of each required similar competences (e.g. competences in line-width reduction), there were also differences. DRAMs required relatively more expertise in manufacturing (e.g. low cost production) and less expertise in product design (e.g. mastering design complexity) than microprocessors. By the early 1980s, DRAMs had become a commodity and Intel found it increasingly difficult to maintain a competitive advantage over its Japanese competitors. The situation was very different for microprocessors, which was also the newer product. In that case, it was possible to create specific capabilities and gain a competitive advantage in product design. By 1985,

[2]For a much more detailed account of Intel's situation, see Burgelman (1994), on which this example is based. We here present a much condensed version of the issues related to Intel's decision to exit the market for DRAMs, in order to highlight the main points of that case that are relevant to our model. Naturally, not all of the details of the Intel case can be replicated in our stylized model.

there was a clear discrepancy between Intel's official business strategy, which was to continue to support DRAMs (as expressed by its CEO Gordon Moore), and the actions of middle-level managers. Those had already started to change practices, to refocus, and to acquire new expertise specific to microprocessor production. According to Burgelman (1994), Andy Grove (at the time Intel's COO) recalled that: "By mid-1984, some middle-level managers had made the decision to adopt new process technology which inherently favored logic [microprocessor] rather than memory advances (...)." As a consequence of this adoption of new practices and processes, Intel's management decided to exit the DRAM business altogether and implement organizational change (called "internal creative destruction" by Grove). Ultimately, given the competitive situation in DRAMs (tough competition and high costs of sustaining a competitive advantage) and microprocessors (soft competition, growing market, and the possibility to build and sustain specific capabilities in process design), the actions and beliefs of its employees led Intel's top management to focus on microprocessors, in order to align its business strategy with the organizational beliefs.

The key ingredients of our model and its main implications are consistent with this case. First, the actions of employees are aligned with the expected business strategy, which (at the time when actions are taken) is not necessarily the official strategy. In particular, the actions of middle-level management that diverge from the official business strategy are antecedents of organizational change. Second, competition can act as a catalyst for organizational change. Third, organizational inertia exists and hampers (in Intel's case, delays) organizational change. Fourth, top management must be flexible in their choice of strategy if that is crucial for organizational change to happen. Intel's top management let middle managers develop and adapt to new practices, and proved itself flexible enough to give up a formerly promoted strategy in light of the evidence (the newly adopted practices and the diminished competitiveness in DRAMs).[3] Fifth, future changes in strategy are possible only

[3]This flexibility was characteristic of Andy Grove's management style. According to Grove: "A corporation is a living organism; it has to continue to shed its skin. Methods have to change. Focus has to change. Values have to change. The sum total of those changes is transformation." (From Esquire Magazine, May 2000).

if there is a sufficiently large proportion of employees who choose to undertake strategy-specific investments.[4] Organizational change requires sufficient coordination, which leads to a "tipping point" equilibrium. Intel's production capacity had already shifted towards microprocessors by 1985, but the tipping point for real organizational change (and the exit from DRAMs) came only after middle-level managers adopted new processes. As in our model, sufficient adoption of new practices and the associated coordination lead the way for organizational change and subsequent changes in corporate strategy.

2. Related Literature

Economic theories of business strategy often emphasize the importance of commitment. Commitment is important not only because of its competitive and entry-deterrence effects (e.g. Ghemawat, 1991), but also because it affects a firm's organizational belief (i.e. the prevailing belief among employees about its future business; see Van den Steen, 2005) and its internal incentive structure (e.g. Rotemberg and Saloner, 1994). By committing to a specific strategy, a firm may be able to coordinate the efforts of their employees and thus operate more efficiently. Employees have incentives to coordinate and undertake strategy-specific investments only if they can be sufficiently optimistic about the alignment of these investments with the firm's business strategy. Such an optimistic belief about strategic alignment can be achieved only if the commitment to the future strategy is credible. A natural questions is then: What makes business strategies credible?

A small but growing literature in economics is concerned with this question. A common element in this literature is the focus on personal characteristics of leaders as a means to give credibility to proposed business strategies. Managers who are biased towards certain strategies, perhaps because of their preferences, vision, overconfidence, or opinions, are often

[4]Referring to the fact that middle-level managers had made the decision to adopt process technologies that favored microprocessors, Grove said that: "The faction representing the microprocessors business won the debate even though the 80386 [microprocessor] had not yet become the big revenue generator that it would eventually become." (see Burgelman 1994).

seen as necessary for conferring credibility to strategies (Rotemberg and Saloner, 2000; Van den Steen, 2005; Blanes-i-Vidal and Möller, 2007; Bolton, Brunnermeier, and Veldkamp, 2008; Hart and Holmström, 2010). Alternatively, career concerns may also explain why leaders can commit to a strategy even when changing strategies is more profitable (Ferreira and Rezende, 2007). Those papers consider the firm in a quasi-monopolistic situation; they do not model the competitive environment in which the firm operates and implements its strategy. Quite naturally then, they do not consider the impact of competition on the credibility of business strategies and the formation of organizational beliefs.

A long tradition in the strategic management literature focuses on the roles of firm capabilities and of competition in shaping business strategy. Nevertheless, the analysis of the interactions between capabilities, competition, strategy, and performance is still an understudied topic in the strategic management literature (see e.g. Henderson and Mitchell,1997), and even more so in the organizational economics literature (see Gibbons (2010) for a recent survey of the literature).[5] In our model, the firm's choice of position affects its ability to create a unique capability, which in turn reinforces its competitive position. Thus, firm capabilities and the choice of business strategy are both endogenously determined.

Our paper also proposes a new framework for modeling organizational inertia. Here we follow Kaplan and Henderson's (2005) insights that inertia may arise due to difficulties in changing implicit contracts with employees. According to Kaplan and Henderson (2005), the creation of organizational routines requires an understanding about "what should be rewarded" and "what should be done." They argue that the often poor performance of "ambidextrous" organizations may be due to the difficulties in managing multiple sets of competences or routines within the same firm. Accordingly, in our model we assume that, in order to build a superior organizational capability, the firm must be focused. It is the firm's temptation to diversify and enter new markets that makes workers reluctant to support organizational changes, which would otherwise be beneficial to all. If workers invest in

[5] The importance of building specific capabilities in competitive environments has also been a theme in the Industrial Organization and International Trade literature, e.g. see Sutton (2012).

creating an organizational capability, but later the firm chooses not to exploit it fully, they do not benefit from their initial investments.

A recent paper by Dow and Perotti (2010) develops an alternative model of organizational inertia. In that model, employees resist to (potentially Pareto improving) changes because the process of change creates winners and losers, and contractual incompleteness prevents the full compensation of losses. Our model has a similar flavor, but it focuses instead on coordination issues.

As argued in the previous section, our paper relates to the literature on X-(in)efficiencies, originating from Leibenstein (1966). According to Stigler (1976) and Frantz (1992), X-inefficiencies originate from the resolution of the trade-off between lower production costs and higher contracting costs, and consequently are not inefficiencies per se. Schmidt (1997) offers an explicit model of this trade-off, and shows that competition may have ambiguous effects on managerial incentives to reduce costs. Raith (2003) also formally models this trade-off under varying degrees of competition and studies how market structure affects production costs. In a heterogeneous goods oligopoly model with endogenous entry, more competition (as measured by the degree of product substitutability) increases a firm's marginal incentive to reduce costs. As more competition reduces the number of active firms in equilibrium, each firm produces a larger output. Thus, firms evaluate the production versus agency costs trade-off more favorably, and provide stronger incentives to their managers to reduce costs. Nevertheless, total firm profits (which are always zero due to endogenous entry) and the agent's payoff (who is just paid enough to fulfill his exogenous participation constraint) are independent of competition.

In contrast with this literature, our model not only highlights a different source of X-inefficiency (i.e. coordination failure), but also shows that "real" inefficiencies, i.e. profit-reducing inefficiencies, can vanish under more intense competition. In that sense, our model relates to a broader notion of X-inefficiency and provides an explanation for its potential existence.

Finally, our model also offers a framework for thinking about firm heterogeneity. There is a substantial amount of evidence that seemingly similar firms display persistent differences in performance (for recent surveys, see Bloom and Van Reenen (2010), Gibbons (2010), and Syverson (2011)). In our model, small variations in the strength of the organizational status quo can have drastic consequences for performance. Absent competition, these performance differences may be persistent. Recent empirical evidence by Bloom, Sadun, and Van Reenen (2010) suggests that competition triggers organizational change. Our model provides a coherent account for all these intriguing empirical facts.

3. Setup

We describe our model in two steps. First, we explain our modeling of the organization. Then we describe the organization's competitive environment.

3.1. Organization

We consider a firm that can produce two different products, A and B, and whose single input is human capital. Specifically, production requires a CEO and a continuum (of mass 1) of workers. Workers, CEOs, and the shareholders of the firm are risk neutral. The firm can produce both products simultaneously. Efficiency (i.e. the cost) of production depends on the firm's *organizational configuration*, which is our term for the set of practices and routines adopted by the firm's workforce. Under the status quo organizational configuration, the firm's *cost structure* is represented by $\overline{c}$. The same cost structure applies to both products.[6] One possible interpretation is that parameter $\overline{c}$ is the marginal cost of production. As it will become clear later, other interpretations are also possible.

The workers can coordinate and adopt a new organizational configuration that allows the firm to become more efficient in the production of one of the products; without loss of

[6]The assumption that under the status quo production costs are equal for both products simplifies the notation and the exposition, without affecting any of the qualitative insights that we derive.

generality, this product is A. If coordination is achieved, the firm develops a *unique capability* in A.[7] When the firm exploits this unique capability, the organizational configuration changes and the production of A becomes more efficient. The more efficient cost structure created by the exploitation of a unique capability is represented by $\underline{c}$. To simplify the exposition, from now on we simply refer to $\overline{c}$ as "high cost" and to $\underline{c}$ as "low cost."

The CEO decides whether the incumbent firm diversifies or focuses on A. The firm can only exploit a unique capability if it focuses on the production of A. That is, the new configuration does not generate efficiency gains if the incumbent chooses to diversify and produce both A and B. Our assumption is that an A-specific capability cannot be adapted to the production of both A and B. Intuitively, workers cannot efficiently use two different sets of practices and routines, hence they cannot exploit the unique capability for A if they also have to produce B. Such assumptions are meant to capture the idea that firms find it hard to develop *generic capabilities*, i.e., capabilities that can be leveraged across many different products. We hard-wire an intuitive trade-off in our model: generic capabilities generate lower profits than unique (i.e., market-specific) capabilities, but they can be applied to multiple markets simultaneously. Moreover, unique capabilities are of no use if the incumbent decides to diversify. This assumption is reasonable, e.g., if producing the two products simultaneously requires the use of the same set of workers.

Changing the status quo organizational configuration requires a coordinated effort by a large number of workers. Coordination is required because the tasks performed by workers are complementary, while effort is required because workers need to develop and learn the more efficient practices and routines. We assume that workers invest in acquiring configuration-specific skills by paying a non-pecuniary and non-observable cost $e \in (0, 1)$ (e.g. *effort*).[8] Individual investment in the new configuration is non-observable; the CEO

[7] The firm cannot create unique capabilities for both products, either because it does not have the scale or resources to do so, or because it is not possible to acquire a unique capability in one of the products, as was the case for DRAMs in the motivating example from the introduction.

[8] These costs can be thought of as the mental costs of identifying, exploring and/or coordinating ideas for new practices. More generally, they stand for a person's general reluctance to change and explore new ways of doing things.

only observes the aggregate outcome of these investments, i.e., whether the status quo configuration is abandoned or not. If the status quo configurations is abandoned *and* a new capability is exploited (i.e. the firm focuses on A), the workers who paid the cost e benefit more from changing the organization than those who did not adjust to the new configuration: the former receive a noncontractible benefit that we normalize to 1, while the latter earn zero benefits. Intuitively, workers who have not adapted to the new configuration will perform poorly and fit less well with the organization, with possible negative implications for future career prospects, job satisfaction, and the like.

The strength of the status quo organizational configuration is measured by a real number θ. The status quo configuration is abandoned in favor of a new organizational configuration if and only if a fraction of workers $y \geq \theta$ choose to learn new practices. Thus, θ can be seen as a measure of organizational inertia, in the sense that abandoning the status quo is more difficult the larger θ is. A new configuration allows for the exploitation of a unique capability in A only if the incumbent decides to pursue a focused strategy (i.e. to produce only A). As diversification decisions are made by the CEO after knowing whether sufficiently many workers adopted new practices (whether $y \geq \theta$), workers must have beliefs about the likelihood of organizational change. Assume initially that, conditional on $y \geq \theta$, workers believe that the the focused strategy is pursued with probability $b \in [0, 1]$. Formally, $b \equiv \Pr(\text{CEO chooses to produce } A \text{ only} \mid y \geq \theta)$. In this section we treat b as given; later we endogenize b. We assume that organizational configuration is too vague a concept to be included in contracts, thus explicit incentive contracts that reward workers for organizational change are not feasible.

If $\theta \leq 1$ and $b > e$, the unconstrained first best requires all workers to invest in changing the configuration. However, the first best may not be attained in equilibrium. If all workers know the strength of the status quo (i.e. θ is common knowledge), there are two (pure strategy) equilibria in this game: either everyone invests or no one invests. Thus, the organization could be stuck in an inferior equilibrium. To obtain a unique equilibrium with

intuitive features, we consider the limiting case of a model with heterogeneous information about θ. We borrow the setup from the literature on global games; specifically, here we follow closely the benchmark "regime change" model as described by Angeletos, Hellwig, and Pavan (2007). We assume that $\theta \sim N(0,1)$ and that each worker receives a signal $x_i = \theta + \varepsilon_i$, with $\varepsilon_i \sim N(0, \sigma^2)$ that is i.i.d. across workers and independent from θ.[9] As workers choose whether or not to invest simultaneously, worker $i \in [0,1]$ invests if and only if

$$b \Pr(y \geq \theta \mid x_i) - e \geq 0,$$

where $\Pr(y \geq \theta \mid x_i)$ denotes the probability that worker i assigns to the outcome that workers coordinate and abandon the status quo configuration. We consider the limiting case in which the uncertainty about θ becomes arbitrarily small, i.e. when $\sigma^2 \to 0$. We have the following result:

Lemma 1 *For a given θ, if $\sigma^2 \to 0$, in the unique equilibrium we have that the mass of workers who invest is given by:*

$$y^*(b) = \begin{cases} 1 & \text{if } 1 - \theta \geq \frac{e}{b}, \\ 0 & \text{otherwise.} \end{cases} \tag{1}$$

We omit the proof of this result as this is a special case of the regime change model. For example, this lemma can be seen as a corollary of Proposition 1 in Angeletos et al. (2007) or Proposition 1 in Dasgupta (2007). Here we note that the equilibrium has intuitive properties. First, coordination is more likely to occur under more optimistic beliefs, i.e. if b is high. This is key in our analysis; b is endogenously determined in equilibrium and is affected by competition and leadership styles (see Sections 4 and 5). Second, coordination is more likely if the investment cost e is low. Finally, coordination is more likely when θ, which is a direct measure of how difficult coordination is (that is, a measure of organizational

[9] We can more generally assume that θ is normally distributed with any mean and variance; all results would go through (see Angeletos et al., 2007, for details).

inertia), is low.

If $\theta \in (0,1)$, in order to achieve coordination, the belief has to be $b \geq \frac{e}{1-\theta}$. In this case, each worker's net expected benefit from adopting new routines is positive (i.e. $b > e$). To be sufficiently incentivized to invest in adapting to a new configuration, a worker has to receive a *coordination rent* of $b - e \geq \frac{e}{1-\theta} - e = \frac{\theta}{1-\theta}e$. This coordination rent can be thought of as a compensation for the risk that coordination could fail, which would make the skills acquired by the worker worthless. Even though uncertainty about θ becomes arbitrarily small, workers behave as if coordination may fail with probability θ. This reasoning is the same as the one underlying the concept of risk dominance in a two-player coordination game (Harsanyi and Selten, 1988). In such games, although whether coordination is achieved is common knowledge in a pure-strategy Nash equilibrium, in the risk-dominant equilibrium each player selects her strategy as if she was uncertain about the other player's action.[10] We thus call this uncertainty (*Harsanyi-Selten) strategic uncertainty.* If the belief in organizational change (b) is not strong enough to compensate workers for bearing strategic uncertainty, workers would not coordinate on the efficient equilibrium.

Our stylized model is rich in scope. An *organization's propensity to change* can be fully described by (θ, e, b), where θ is the strength of the status quo configuration, e is the individual cost of organizational change, and b is the belief in organizational change. Management choices, technological changes, and market forces can affect the parameters that define an organization's propensity to change. For example, process innovation or the adoption of new management practices can make coordination easier or more difficult to

[10] This analogy to risk-dominant equilibria becomes clearer if one modifies the coordination game as follows. Assume that there are only two workers and each can either adopt new routines ("a") or abstain from doing so ("na"). Adopting new routines comes at a cost of e and results in a benefit of b if both players play "a." In this standard coordination game there are two pure-strategy equilibria, (a,a) and (na,na). The risk-dominant equilibrium is (a,a) if and only if $b \geq 2e$, i.e., in the risk-dominant equilibrium a player only plays "a" if coordination results in a benefit that is strictly larger than the cost of choosing "a." It is known from the literature on global games (see e.g. Carlsson and van Damme, 1993) that if one introduces uncertainty about payoffs, under certain conditions, as private uncertainty about payoffs becomes small, only one of the two strategy profiles (a,a) and (na,na) will be played in equilibrium. Furthermore, as private uncertainty becomes small, workers will choose the strategy profile that constitutes the risk-dominant equilibrium of the game with complete information.

achieve, i.e., they may reduce or increase θ. Compensation practices and workplace norms can reduce or increase the cost of investing in coordination (e). Our focus in this paper is instead on b, which is a measure of organizational beliefs. A larger b means that workers are more likely to trust managers not to deviate from A, once coordination is achieved. We thus consider the role of market forces and management styles in shaping beliefs (b).

3.2. Markets and Competition

We assume that the firm is initially active in both markets, A and B.[11] The analysis of the case in which the firm is initially active in market A only is essentially identical to the one we describe here.[12]

At some future date, market conditions might change and the CEO will have to decide whether to operate only in A or in both A and B. In short, it is a choice between a focused business strategy and a corporate diversification strategy.[13] The profitability of each market depends on the cost structure, the demand structure, and the competitive environment. We have already described the cost structure in the previous section. Here we describe the demand structure and the competitive environment.

Demand. There is ex ante uncertainty regarding which of the two markets (A or B) will have higher demand. Define the random variable $d \in \{A, B\}$, the *demand shock*, and let $\rho \in [0, 1]$ denote the probability that $d = A$. We interpret the parameter ρ as the probability that A has higher demand than B.

Consumers are heterogeneous, thus a niche market for each of the two products always exists and, in each market, strictly positive monopoly profits are possible. The incumbent's profit as a monopolist in a specific market (A or B) depends only on its costs and on

[11] This can be thought of as the official strategy of the CEO, or the status quo.

[12] The case in which the firm is only active in B has little economic significance, as the unique capability can only be created for A.

[13] The CEO has to decide whether to stick to the official (diversification) strategy or to abandon it (as has happened in Intel's case). Here we speak of two different markets but we could also interpret A and B as being two different strategies or business models. Thus, the model can also easily accommodate the case in which strategies A and B are mutually exclusive.

the demand shock.[14] Let $\overline{\Pi}_X(c)$ denote the profit of an incumbent monopolist in market $X \in \{A, B\}$ with cost $c \in \{\underline{c}, \overline{c}\}$, where the bar on top of Π denotes high demand in market X $(d = X)$. Similarly, $\underline{\Pi}_X(c)$ denotes the incumbent's monopoly profit in X if market X has low demand $(d \neq X)$. For simplicity only, we assume that both markets are perfectly symmetric, thus $\overline{\Pi}_A(c) = \overline{\Pi}_B(c) \equiv \overline{\Pi}(c)$ and $\underline{\Pi}_A(c) = \underline{\Pi}_B(c) \equiv \underline{\Pi}(c)$, for any $c \in \{\underline{c}, \overline{c}\}$. Consistent with our assumptions about demand and costs, we further assume that

$$\begin{aligned} \overline{\Pi}(c) &> \underline{\Pi}(c) > 0 \text{ for } c \in \{\underline{c}, \overline{c}\}, \\ \overline{\Pi}(\underline{c}) &> \overline{\Pi}(\overline{c}) \text{ and } \underline{\Pi}(\underline{c}) > \underline{\Pi}(\overline{c}). \end{aligned}$$

Competition. There is one potential competitor (the *entrant*). The entrant chooses one of four possible actions: (i) enter in market A, (ii) enter in market B, (iii) enter in both markets simultaneously, or (iv) stay out of both markets.[15] We adopt a reduced-form approach and abstain from micro-modeling the market game played by the incumbent and the entrant. With probability τ_X the entrant is competitive in X, i.e. it can profitably compete with a high-cost incumbent in X. The entrant enters market A if and only if it is competitive in A and the incumbent does not have a unique capability in A. The entrant enters market B if and only if it is competitive in B. Whenever the entrant enters a market, the incumbent's profit in that market is zero (a normalization).[16] We denote the *competitiveness* of the entrant by a random variable $C = (C_A, C_B) \in \{co, nc\}^2$, where $C_X = co$ if the entrant is competitive in market X. For simplicity only, we assume that C_A and C_B are independently distributed.[17]

[14] It could also depend on the incumbent's strategy in the other market. We ignore such effects to keep the model simple.

[15] Our setup is equivalent to a model with two competitors, in which one competitor can only enter in market A and the other competitor can only enter in market B.

[16] Such entry strategies can be part of a subgame perfect equilibrium in a sequential entry game where the entrant's marginal costs are random and first the incumbent's CEO makes an irreversible decision of whether or not to focus on one of the markets, and then the entrant follows by choosing whether to enter in each market. The payoff structure when two firms are operating in the same market can be generated by a Bertrand-style game of competition.

[17] Our interpretation is that some technological innovation developed by the entrant allows it to enter these

We assume that organizational change cannot take place as a response to entry; the necessary investments have to be made prior to the realization of the entrant's competitiveness indicator. This reflects the idea that organizational change is a time consuming process; the necessary investments have to occur long before new capabilities can be exploited.

Commitment. Due to frictions in the contracting environment, we assume that the CEO is not able to commit to a given strategy before the realizations of cost and demand conditions, and is thus subject to potential dynamic inconsistency problems. That is, we rule out by assumption any kind of contractual solution that would commit the CEO to a given strategy. Commitment problems are at the core of our model, thus we are only interested in cases in which contractual solutions for these problems are not possible (or are imperfect). This assumption is standard in the related literature on leadership, which is reviewed in Section 2. This assumption is also particularly realistic in our application, as concepts of "strategy" and "organizational change" are vague and difficult to describe ex ante in formal contracts, although they might, to some extent, be observable and even easily understood by all agents.

Many of the conclusions of our model survive under different assumptions that allow for varying degrees of imperfect contractibility. We do not pursue such extensions here; these extensions are uninteresting and distract us from our main goal.

Timing. The timing of events is as follows:

At period 0, the incumbent firm, consisting of a CEO and a set of workers, is active in markets A and B. Workers decide whether to invest e or not.

At period 1, the incumbent's CEO observes whether or not there is a new organizational configuration. All uncertainty is fully resolved: both the demand shock d and the entrant's competitiveness indicator C are realized and can be observed by all.

At period 2, the incumbent's CEO decides which strategy $s \in \{A, AB\}$ to pursue, where A is the focused strategy and AB is the diversification strategy. This decision becomes

markets with a more efficient cost structure. We abstract from the costs of innovation; allowing for such costs is straightforward and creates no difficulties for the model.

common knowledge.

At period 3, entry decisions are made and profits are realized.

4. The Impact of Competition on Business Strategy

At period 2, the firm's choice of strategy is contingent on the entrant's competitiveness C, which is known to the incumbent's CEO in that period. Denote the firm's total expected profits conditional on $y \geq \theta$ by $\Pi(s, d, C)$, where $s \in \{A, AB\}$ is the strategy chosen by the CEO and $d \in \{A, B\}$ denotes the demand shock. Then, the CEO's optimal strategy given $y \geq \theta$ is a function $s^*(d, C) : \{A, B\} \times \{co, nc\}^2 \to \{A, AB\}$ such that[18]

$$s^*(d, C) = \begin{cases} A & \text{if} \quad \Pi(A, d, C) \geq \Pi(AB, d, C) \\ AB & \text{else.} \end{cases} \tag{2}$$

To streamline the exposition, we only consider realizations of θ for which the following assumption holds:[19]

Assumption A1 $\theta \in [0, 1 - e]$.

In equilibrium, we require workers to make their optimal decisions given their equilibrium belief b^* and the equilibrium mass of workers y^* as given by (1). Moreover, the belief has to be consistent with the CEO's optimal strategy conditional on coordination being achieved. To be more precise, we define the following:

[18] We assume that the CEO always chooses A over AB if she is indifferent between both strategies. This is only relevant in the degenerate cases $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) = \underline{\Pi}(\underline{c})$ and $\underline{\Pi}(\underline{c}) = \overline{\Pi}(\overline{c})$ for which one would also obtain multiplicity of equilibria (in Proposition 1 below) if choosing AB over A was also permitted.

[19] Solving the model in the cases $\theta < 0$ and $\theta > 1 - e$ is straightforward. No additional insights are obtained in these cases.

Definition 1 *An equilibrium is given by* (b^*, y^*)*, such that:*

1. *the belief* b^* *is correct, i.e.*

$$b^* = E_C\left[\rho \Pr\left(s^*\left(A, C\right) = A\right) + \left(1-\rho\right) \Pr\left(s^*\left(B, C\right) = A\right)\right],$$

where $E_C\left[.\right]$ *denotes the expectation over the entrant's competitiveness indicator* $C = \left(C_A, C_B\right) \in \left\{co, nc\right\}^2$*;*

2. *the mass* y^* *of workers who invest in a new configuration is given by:*

$$y^* = \begin{cases} 1 & \text{if } b^* \geq \frac{e}{1-\theta} \\ 0 & \text{if } b^* < \frac{e}{1-\theta} \end{cases}. \tag{3}$$

We refrain from incorporating the CEO's strategy $s^*\left(d, C\right)$ (as given by (2)) in the definition of equilibrium to keep the exposition simple. According to Lemma 1, condition (3) uniquely describes optimal workers' behavior.[20]

The following proposition characterizes the equilibrium value of the *belief in organizational change* b^*:

Proposition 1 *For any set of parameters* $(\theta, e, \rho, \tau_A, \tau_B)$ *a unique equilibrium exists. This is fully characterized by (3) and the following values of the belief in organizational change:*

1. $b^* = 1$ *if* $\overline{\Pi}\left(\overline{c}\right) + \underline{\Pi}\left(\overline{c}\right) \leq \underline{\Pi}\left(\underline{c}\right)$,

2. $b^* = \rho + \left(1-\rho\right)\left(\tau_B + \left(1-\tau_B\right)\tau_A\right)$ *if* $\overline{\Pi}\left(\overline{c}\right) + \underline{\Pi}\left(\overline{c}\right) \in \left(\underline{\Pi}\left(\underline{c}\right), \overline{\Pi}\left(\underline{c}\right)\right]$ *and* $\overline{\Pi}\left(\overline{c}\right) \leq \underline{\Pi}\left(\underline{c}\right)$,

3. $b^* = \rho + \left(1-\rho\right)\tau_B$ *if* $\overline{\Pi}\left(\overline{c}\right) + \underline{\Pi}\left(\overline{c}\right) \in \left(\underline{\Pi}\left(\underline{c}\right), \overline{\Pi}\left(\underline{c}\right)\right]$ *and* $\overline{\Pi}\left(\overline{c}\right) > \underline{\Pi}\left(\underline{c}\right)$,

4. $b^* = \tau_B + \left(1-\tau_B\right)\tau_A$ *if* $\overline{\Pi}\left(\overline{c}\right) + \underline{\Pi}\left(\overline{c}\right) > \overline{\Pi}\left(\underline{c}\right)$ *and* $\overline{\Pi}\left(\overline{c}\right) \leq \underline{\Pi}\left(\underline{c}\right)$,

5. $b^* = \tau_B + \rho\left(1-\tau_B\right)\tau_A$ *if* $\overline{\Pi}\left(\overline{c}\right) + \underline{\Pi}\left(\overline{c}\right) > \overline{\Pi}\left(\underline{c}\right)$ *and* $\overline{\Pi}\left(\overline{c}\right) > \underline{\Pi}\left(\underline{c}\right)$.

[20] Note that b^* is defined independently of y^*.

Proof. See the Appendix. ■

Proposition 1 shows that the strength of the belief in organizational change b^* is weakly increasing in both τ_A and τ_B. If b^* is too small, workers will not coordinate and invest in the new configuration (see (3)). Therefore, low intensity of competition hampers organizational change. For example, if $\tau_A = \tau_B = 0$, in cases 2 and 3 of Proposition 1 organizational change does not happen ($y^* = 0$) for values $\rho \in [e, \frac{e}{1-\theta})$, despite being Pareto-improving. If $\tau_A = \tau_B = 0$, in cases 4 and 5 organizational change does not happen regardless of ρ.

To understand the intuition behind Proposition 1 and its many implications, we discuss some of the cases separately. Case 1 implies that the firm always chooses strategy A if workers invest in the new configuration. Full commitment to the focused strategy is achieved because the new cost structure is so efficient that it makes the focused strategy preferable to the diversified strategy even under low demand ($\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) \leq \underline{\Pi}(\underline{c})$). The first-best level of coordination is always achieved in this case. Intuitively, the unique capability created by worker coordination is so strong that it makes organizational change self-fulfilling. In the more interesting cases 2 to 5, however, the unique capability is not so strong; worker coordination is a necessary but not sufficient condition for organizational change.

In cases 2 to 5, unless $\tau_A = \tau_B = 1$, the CEO chooses the diversified strategy with some positive probability even if coordination is achieved, thus full commitment to A is not possible. Organizational change is less likely if the expected profit from choosing AB is high. To see this, notice that, if $\overline{\Pi}(\overline{c}) \leq \underline{\Pi}(\underline{c})$, as $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c})$ increases we move from cases 1 to 2, and then to 4, and the belief b^* falls. If $\overline{\Pi}(\overline{c}) > \underline{\Pi}(\underline{c})$, as $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c})$ increases we move from cases 1 to 3, and then to 5, and again the belief b^* falls. Cases 2, 3 and 5 show that organizational change is more likely if ρ, the probability of a positive demand shock in market A, is high.

The different cases in Proposition 1 illustrate that, for a large constellation of parameters, profits would be larger and workers would be better off if they could coordinate and invest in creating a unique capability in A. Thus, there might be too little investment in reducing

costs and too much diversification in equilibrium. The model implies that high costs and excessive diversification go hand in hand.

The main results we wish to emphasize are those related to the strength of competition. As competition intensifies (as τ_A or τ_B increase) diversification (i.e. playing $s = AB$) becomes less attractive for two reasons. First, as τ_B increases, market B becomes less profitable in expectation, because of the threat of competition. We call the effect of τ_B on organizational change the *contestability effect*. Second, as entry in market A becomes more likely (i.e. τ_A increases), the firm may choose to focus ($s = A$) in order to become more efficient and deter entry in A. We call this the *entry-deterrence effect*. Whereas the contestability effect is present whenever focus does not trivially dominate diversification (cases 2 to 5), the entry-deterrence effect is not present in case 3. This is because $s = A$ is the dominant strategy if $d = A$ (which makes the decision independent of competition in that case), while if $d = B$, when the entrant is not competitive in B, the incumbent always prefers to diversify.

We conclude that competition fosters organizational change. Because competition reduces the attractiveness of diversification, workers are more confident that they will be rewarded if they invest in A-specific routines.[21]

We now summarize some of our main results in the form of corollaries. The first corollary summarizes the previous discussion:

Corollary 1 *Tougher competition (i.e. an increase in τ_A or τ_B) improves coordination inside the firm and reduces costs.*

Proof. It follows immediately from the effects of τ_A and τ_B on b^* and from (3). ■

In a similar vein, smaller organizational inertia (a decrease in θ), larger demand for

[21] The situation of Intel in the motivating example of the introduction can best be described as follows. The incumbent (Intel) is active in markets A (microprocessors) and B (DRAMs). In market B it possibly faces tough competition in the future. It is impossible to create a unique capability for B and the incumbent cannot fend off potential entry in B. The situation is different for market A. A unique capability for A can be created, and with it Intel can gain market dominance. In anticipation of a future change in strategy and of tougher competition in B, Intel's middle management refocused on market A, in opposition to the official strategy at the time ($i.e. AB$). This again acted as a catalyst for organizational change and the repositioning of Intel.

product A (an increase in ρ) and lower coordination costs (a decrease in e) all contribute to coordination and organizational change.

Another interesting result is that competition can have a positive effect on the incumbent's profit, but only if competition acts as a catalyst for organizational change. More precisely, an increase in competition may lead to a discontinuous increase in coordination and thus to a discontinuous drop in costs. This happens if competition changes b^* from just below $\frac{e}{1-\theta}$ to just above $\frac{e}{1-\theta}$. In some cases, profits under sufficiently intense competition are larger than those in the absence of any competition (i.e. with $\tau_A = \tau_B = 0$).

Corollary 2 *Tougher competition may increase the incumbent's profits. In particular, a situation in which the incumbent faces potential competition can be more profitable for the incumbent than complete absence of any competition.*

Proof. See the Appendix. ■

This seemingly counter-intuitive result is explained by the positive effect of competition on coordination, and thus on profits. Intuitively, an increase in competition can solve the CEO's commitment problem and induce investments in a more efficient organizational configuration. Competition reduces expected profits everywhere but at $b^* = \frac{e}{1-\theta}$, where profits jump upwards because of the elimination of inefficiencies. In addition, a worker's payoff jumps upwards by the coordination rent of $\frac{\theta}{1-\theta}e > 0$ at $b^* = \frac{e}{1-\theta}$ (see Subsection 2.1). Thus, *total production efficiency*, as given by the sum of workers' and the firm's payoffs, strictly increases as well. More precisely, if we measure total workers' surplus by $\int_0^1 (1-e)\, dF(x) = 1-e$ (given the assumption of a mass of 1 of workers) if a unique capability is created, then total workers' surplus at $b^* = \frac{e}{1-\theta}$ jumps upwards by the coordination rent $\frac{e}{1-\theta}(1-e) - \left(1 - \frac{e}{1-\theta}\right)e = \frac{\theta}{1-\theta}e$. This proves the following corollary:

Corollary 3 *Tougher competition may increase workers' surplus and total production efficiency.*

Due to coordination frictions (i.e. $\theta > 0$) and their associated coordination rents, workers' surplus and total production efficiency can discontinuously increase once the intensity of competition reaches a critical threshold. Thus, if the incumbent could capture some of this additional surplus, an even larger increase in the incumbent's profits would be possible.

5. Optimal Leadership Styles

In this section we ask how a CEO's "leadership style" affects the choice of organizational configuration and, consequently, profits in the presence of competition. We assume that there are two possible types of CEOs, each one with a different leadership style $l \in \{f, v\}$: a CEO can be either *flexible* (type f) or *committed/visionary* (type v). The CEO's leadership style is common knowledge. A flexible CEO always selects the strategy that maximizes expected profits in a fully rational manner, without any bias towards either A or AB (as in the previous sections). That is, the CEO's chosen strategy $s \in \{A, AB\}$ maximizes profits at period 2. Thus, a flexible CEO cannot credibly commit to either A or AB, and may be subject to the dynamic inconsistency problem that we have discussed in the previous section. In contrast, a committed CEO credibly commits either to strategy $s = A$ or to strategy $s = AB$, independently of the realizations of d, C_A and C_B. Such a commitment is possible either because the CEO has biased preferences towards a specific strategy or because the CEO's beliefs about the profitability of a given strategy differ from the beliefs of the market (Rotemberg and Saloner, 2000; Van den Steen, 2005).

For brevity of exposition, we consider only Case 2 in Proposition 1. This case is more interesting and more complicated than the other cases. In this case, both the contestability effect and the entry-deterrence effect are present, and the focused strategy may be chosen even in the absence of competition. Cases 3-5 can be analyzed in a similar way, and they only contain a subset of the effects analyzed here. Also for brevity of exposition, here we consider only the case in which a committed leader is committed to $s = A$. The case in which

the CEO is committed to the diversified strategy is trivial, in the sense that employing a flexible CEO weakly dominates employing a committed CEO.[22]

If $l = v$, then $b^* = 1$ and the expected profit is

$$\rho\overline{\Pi}(\underline{c}) + (1-\rho)\,\underline{\Pi}(\underline{c}) \equiv \pi_v. \tag{4}$$

We note that competition has no effect on the profit under a committed CEO; if the CEO credibly commits to A, no entry in A occurs. Furthermore, the CEO never diversifies and thus the strength of competition in market B is not relevant.

The optimal leadership style depends on ρ (recall that we are in Case 2 of Proposition 1). If ρ is sufficiently large, such that coordination is always achieved with a flexible CEO (i.e. if $b^* \geq \frac{e}{1-\theta}$), a flexible CEO is optimal. On the other extreme, if ρ is sufficiently small, the benefit of commitment is outweighed by the profit loss caused by the inability to adapt to favorable market conditions in market B. Thus, the flexible CEO is again optimal. A committed CEO is only optimal in the intermediate cases in which commitment is valuable but cannot be achieved by a flexible CEO. This is formally stated in the next proposition:

Proposition 2 *Assume* $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) \in \left(\underline{\Pi}(\underline{c}), \overline{\Pi}(\underline{c})\right]$ *and* $\overline{\Pi}(\overline{c}) \leq \underline{\Pi}(\underline{c})$. *The optimal choice of leadership style* $l^* \in \{f, v\}$ *is given by*

$$l^* = \begin{cases} f, & \text{if } \rho \geq \rho^h \text{ or } \rho \leq \rho^l \\ v, & \text{if } \rho \in \left(\rho^l, \rho^h\right), \end{cases}$$

with

$$\rho^h \equiv \max\left\{\frac{e - (1-\theta)\left[\tau_B + (1-\tau_B)\,\tau_A\right]}{(1-\theta)\left[1 - \tau_B - (1-\tau_B)\,\tau_A\right]}, 0\right\} \text{ and } \rho^l \equiv \min\left\{\tilde{\rho}, \rho^h\right\},$$

[22] In our framework, the ability to commit is only valuable if it leads to organizational change. In particular, this requires commitment to the market for which a unique capability can or needs to be built. Of course, for reasons outside the scope of our model, it is possible that a visionary CEO chooses to promote a diversification strategy and/or to concentrate on a market for which no specific capability can be acquired.

where

$$\tilde{\rho} = \begin{cases} \frac{\underline{\Pi}(\underline{c})-(1-\tau_B)\overline{\Pi}(\overline{c})-(1-\tau_A)\underline{\Pi}(\overline{c})}{(\tau_B-\tau_A)\left[\overline{\Pi}(\overline{c})-\underline{\Pi}(\overline{c})\right]+\underline{\Pi}(\underline{c})-\overline{\Pi}(\underline{c})}, & \textit{if } (1-\tau_B)\,\overline{\Pi}\,(\overline{c}) + (1-\tau_A)\,\underline{\Pi}\,(\overline{c}) > \underline{\Pi}\,(\underline{c})\,, \\ 0, & \textit{otherwise.} \end{cases}$$

Proof. See the Appendix. ■

Proposition 2 provides an intuitive summary of the trade-off between commitment and flexibility and its implications for the optimality of leadership styles. Visionary leaders offer commitment. Commitment is desirable only when (i) coordination cannot be achieved without commitment and (ii) the value of ex post adaptation is low. Visionary or committed CEOs are necessary to implement focused strategies that are *promising* (ρ not too low) but *risky* (ρ not too high). In the case of focused strategies that are either too risky (so that the real option to switch is too valuable) or "home runs" (everyone believes that there is a high probability of success), a flexible CEO performs better than a committed CEO. The main message here is that strong vision (commitment) is more valuable when coordination is both more valuable and more difficult to achieve.

The optimal choice of leadership style also depends on the threat of competition. Whenever $b^* = \rho + (1-\rho)\left(\tau_B + (1-\tau_B)\,\tau_A\right) \geq \frac{e}{1-\theta}$, or equivalently

$$\tau_A + \tau_B - \tau_A\tau_B \geq \tau^h\left(\rho\right) \equiv \frac{1}{1-\rho}\left[\frac{e}{1-\theta} - \rho\right],$$

the optimal leadership style is flexible ($l = f$). We have that $\tau^h\left(\rho\right)$ is decreasing in ρ. The substitutability between ρ and τ_B is intuitive; both increase the (ex-ante) attractiveness of A as compared to B. In contrast, the substitutability between ρ and τ_A is less intuitive, as it relies on the entry-deterrence effect: increased competition in A can make it more important to defend A, even if demand is higher in B. Thus, if competition is sufficiently strong, leadership flexibility is desirable.

For lower levels of competition $\left(\tau_A + \tau_B - \tau_A\tau_B < \tau^h\left(\rho\right)\right)$, either flexible or committed

leadership may be optimal. Similarly to the results in Proposition 2, there is a non-monotonic relationship between competition and leadership styles. There are again three cases. First, under very intense competition, coordination without full commitment is possible, thus flexible leadership is optimal. Second, under moderate competition, coordination is not possible without a committed leader. Thus, if coordination is more valuable than flexibility, it is optimal to employ a committed CEO. Finally, if competition is very weak, the diversification strategy becomes more profitable, eventually making the employment of a flexible CEO optimal.[23]

6. Concluding Remarks

Our model relates various market and firm characteristics, such as the intensity of competition, organizational inertia, and CEO leadership styles, to the choice of business strategies. The optimal business strategy depends on the intensity of competition and, in particular, on whether the firm has a competitive advantage with respect to a competitor in its core market. The latter can be achieved by building a unique capability that enables the firm to produce more efficiently than a competitor. In order to build a unique capability, workers have to coordinate their efforts. This coordination happens if sufficiently many workers share a strong belief that the company will choose a focused strategy. Whether the company stays focused or not depends on the intensity of competition, the degree of organizational inertia, and the CEO's leadership style.

Our paper models organizational inertia as a consequence of coordination problems. It is possible to derive many of our results in a different model that abstracts away from coordination issues by assuming a single worker. Nevertheless, we believe that an explicit modeling of coordination frictions has advantages that go beyond addressing the robustness and the realism of our model (or obtaining the welfare implications stated in Corollary 3 and its discussion). Our modeling of these frictions allows for simple comparative statics with

[23] We state these results informally here; their proofs are very similar to that of Proposition 2.

respect to the intensity of organizational inertia, which add to the set of empirical predictions of the model.

We concentrate on two factors that have an impact on workers' beliefs: competition and leadership styles. Both intense competition and a committed leadership style increase the probability that the CEO chooses a focused strategy. Consequently, it is easier to achieve coordination to build a unique capability if (a) competition is tougher and/or (b) the CEO has a visionary/committed leadership style. Effect (a) is closely related to the concept of X-inefficiencies. We here provide a mechanism through which competition can have a positive impact on profits and on total production efficiency: it does so by fostering coordination. Effect (b) adds new insights to the recent economic literature on leadership styles; the value of commitment, and hence the optimal leadership style, can also depend on the strength of competitive forces.

A. Appendix

Proof of Proposition 1.

Proof. The relevant incumbent's profits (conditional on $y \geq \theta$) are given by

$$\begin{aligned}
\Pi(A, A, C) &= \overline{\Pi}(\underline{c}), \text{ for any } C \in \{co, nc\}^2, \\
\Pi(A, B, C) &= \underline{\Pi}(\underline{c}), \text{ for any } C \in \{co, nc\}^2, \\
\Pi(AB, d, (co, co)) &= 0, \text{ for any } d \in \{A, B\}, \\
\Pi(AB, d, (nc, nc)) &= \overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}), \text{ for any } d \in \{A, B\}, \\
\Pi(AB, A, (co, nc)) &= \Pi(AB, B, (nc, co)) = \underline{\Pi}(\overline{c}), \\
\Pi(AB, A, (nc, co)) &= \Pi(AB, B, (co, nc)) = \overline{\Pi}(\overline{c}).
\end{aligned}$$

Case 1: $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) \leq \underline{\Pi}(\underline{c})$. Trivially, once a capability in A is created, the firm can

guarantee a profit of at least $\underline{\Pi}(\underline{c})$ by focusing on A. As this profit is larger than the best-case scenario under diversification ($\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c})$), then the firm always rationally selects A over AB, which implies $b^* = 1$.

Case 2: $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) \in \left(\underline{\Pi}(\underline{c}), \overline{\Pi}(\underline{c})\right]$ and $\overline{\Pi}(\overline{c}) \leq \underline{\Pi}(\underline{c})$. We first note that if $C_B = co$, market B is not profitable, and the CEO chooses the focused strategy regardless of the realization of d and C_A, i.e. $s^*(d, (C_A, co)) = A$. If $d = A$ and $C_B = nc$, comparing profits we find that

$$\begin{aligned}
\Pi(A, A, (nc, nc)) &= \overline{\Pi}(\underline{c}) \geq \overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) = \Pi(AB, A, (nc, nc)) \Rightarrow s^*(A, (nc, nc)) = A, \\
\Pi(A, A, (co, nc)) &= \overline{\Pi}(\underline{c}) \geq \underline{\Pi}(\overline{c}) = \Pi(AB, A, (co, nc)) \Rightarrow s^*(A, (co, nc)) = A
\end{aligned}$$

which implies $s^* = A$ with probability 1 if $d = A$. If $d = B$, we have that $s^*(B, (C_A, co)) = A$ as argued above, and

$$\begin{aligned}
\Pi(A, B, (nc, nc)) &= \underline{\Pi}(\underline{c}) < \overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) = \Pi(AB, B, (nc, nc)) \Rightarrow s^*(B, (nc, nc)) = AB, \\
\Pi(A, B, (co, nc)) &= \underline{\Pi}(\underline{c}) \geq \overline{\Pi}(\overline{c}) = \Pi(AB, B, (co, nc)) \Rightarrow s^*(B, (co, nc)) = A,
\end{aligned}$$

which implies $s^* = A$ with probability $\tau_B + (1 - \tau_B)\tau_A$.

Thus, we have $b^* = \rho + (1 - \rho)(\tau_B + (1 - \tau_B)\tau_A)$.

Case 3: $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) \in \left(\underline{\Pi}(\underline{c}), \overline{\Pi}(\underline{c})\right]$ and $\overline{\Pi}(\overline{c}) > \underline{\Pi}(\underline{c})$. This is identical to Case 2, except that when $d = B$ and $C = (co, nc)$, the firm now chooses $s^* = AB$. Thus we have $b^* = \rho + (1 - \rho)\tau_B$.

Case 4: $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) > \overline{\Pi}(\underline{c})$ and $\overline{\Pi}(\overline{c}) \leq \underline{\Pi}(\underline{c})$. This is identical to Case 2, except that when $d = A$ and $C = (nc, nc)$, the firm now chooses $s^* = AB$. Thus, regardless of d, the probability of $s^* = A$ is $\tau_B + (1 - \tau_B)\tau_A$ and we have $b^* = \tau_B + (1 - \tau_B)\tau_A$.

Case 5: $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) > \overline{\Pi}(\underline{c})$ and $\overline{\Pi}(\overline{c}) > \underline{\Pi}(\underline{c})$. This is identical to Case 4, except that when $d = B$ and (co, nc), the firm now chooses $s^* = AB$. Thus, the probability of $s^* = A$ is $b^* = \rho[\tau_B + (1 - \tau_B)\tau_A] + (1 - \rho)\tau_B = \tau_B + \rho(1 - \tau_B)\tau_A$. ■

Proof of Corollary 2.

Proof. We concentrate on Case 3 of Proposition 1; similar arguments can be made for all the other cases, except Case 1. To simplify the argument, assume $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c})$ is strictly lower than $\overline{\Pi}(\underline{c})$. We first show that profits increase discontinuously at $b^* = \frac{e}{(1-\theta)}$. We then show that there exists a constellation of parameters $(\rho, e, \theta, \tau_B)$ such that monopoly profits are lower than profits under competition (i.e. profits for some strictly positive τ_B).

Consider first the case $b^* > \frac{e}{(1-\theta)}$, i.e. $y^* = 1$. If $d = A$ (which happens with probability ρ), focusing on market A is optimal. This strategy gives a profit of $\overline{\Pi}(\underline{c})$. If $d = B$, diversification is optimal if $C_B = nc$ and focus on A is optimal if $C_B = co$. In the former case, the payoff is $\underline{\Pi}(\overline{c}) + \overline{\Pi}(\overline{c})$ if $C_A = nc$ and $\overline{\Pi}(\overline{c})$ if $C_A = co$. In the latter case, the payoff is $\underline{\Pi}(\underline{c})$. Thus, the incumbent's expected profit is

$$\pi^* = \rho\overline{\Pi}(\underline{c}) + (1-\rho)\tau_B\underline{\Pi}(\underline{c}) + (1-\rho)(1-\tau_B)\left[(1-\tau_A)\underline{\Pi}(\overline{c}) + \overline{\Pi}(\overline{c})\right]. \tag{5}$$

If $b^* < \frac{e}{1-\theta}$ (i.e. $y^* = 0$), we have

$$\pi^* = \rho\left[(1-\tau_A)\overline{\Pi}(\overline{c}) + (1-\tau_B)\underline{\Pi}(\overline{c})\right] + (1-\rho)\left[(1-\tau_A)\underline{\Pi}(\overline{c}) + (1-\tau_B)\overline{\Pi}(\overline{c})\right]. \tag{6}$$

As (5) > (6), we have that π^* is increasing (it jumps upwards) at values of τ_B for which $\rho + (1-\rho)\tau_B = \frac{e}{1-\theta}$.

Now, if $\tau_A = \tau_B = 0$ (the incumbent faces no threat of entry) we have $b^* = \rho$ and if $\rho < \frac{e}{1-\theta}$, the incumbent's profit is $\pi^M = \overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c})$. Keeping $\tau_A = 0$, our goal is to find a set of parameters e, θ, τ_B and $\rho < \frac{e}{1-\theta}$ such that $\pi^* > \pi^M$. Let

$$\rho = \rho' \equiv \frac{\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) - \underline{\Pi}(\underline{c})}{\overline{\Pi}(\underline{c}) - \underline{\Pi}(\underline{c})},$$

which is strictly less than 1 because $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) < \overline{\Pi}(\underline{c})$. Choose any $\frac{e}{1-\theta} \in (\rho', 1)$. Let $\tau_B \in T \equiv \left(\frac{e-(1-\theta)\rho'}{(1-\theta)(1-\rho')}, 1\right)$, i.e. we have $\rho' + (1-\rho')\tau_B \geq \frac{e}{1-\theta}$ for $\tau_B \in T$. Now, take the

limit of π^* as τ_B goes to 1:

$$\lim_{\tau_B \to 1} \pi^* = \rho' \overline{\Pi}(\underline{c}) + (1-\rho')\,\underline{\Pi}(\underline{c}) = \overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) = \pi^M.$$

As π is decreasing in $\tau_B \in T$ we get that for any $\tau_B \in T$, $\pi^* > \pi^M$. ■

Proof of Proposition 2.

Proof. The threshold ρ^h is defined by condition

$$\rho^h + \left(1-\rho^h\right)\left(\tau_B + (1-\tau_B)\,\tau_A\right) = \frac{e}{1-\theta},$$

if ρ^h is strictly positive (if not, it is set to zero). Thus, if $\rho \geq \rho^h$, we have that $\rho + (1-\rho)\left(\tau_B + (1-\tau_B)\,\tau_A\right) \geq \frac{e}{1-\theta}$, which implies that under a flexible CEO, workers invest in the new configuration. Thus, a flexible CEO is trivially superior to a committed CEO: coordination is achieved under either CEO, but the flexible CEO maximizes profit ex post, while the committed CEO does not.

If $\rho < \rho^h$, the flexible CEO cannot motivate workers to invest in the new configuration. To see which style is preferable, we directly compare π_v (as defined in (4)) with the expected profit under a flexible CEO:

$$\pi_f \equiv \rho\left[(1-\tau_B)\,\underline{\Pi}(\overline{c}) + (1-\tau_A)\,\overline{\Pi}(\overline{c})\right] + (1-\rho)\left[(1-\tau_B)\,\overline{\Pi}(\overline{c}) + (1-\tau_A)\,\underline{\Pi}(\overline{c})\right],$$

which implies

$$\begin{aligned}\pi_f - \pi_v \;=\; & \rho\left[(1-\tau_B)\,\underline{\Pi}(\overline{c}) + (1-\tau_A)\,\overline{\Pi}(\overline{c}) - \overline{\Pi}(\underline{c})\right] + \\ & (1-\rho)\left[(1-\tau_B)\,\overline{\Pi}(\overline{c}) + (1-\tau_A)\,\underline{\Pi}(\overline{c}) - \underline{\Pi}(\underline{c})\right].\end{aligned}$$

The first term on the right-hand side is always nonpositive (because $\overline{\Pi}(\overline{c}) + \underline{\Pi}(\overline{c}) \leq \overline{\Pi}(\underline{c})$), while the second term can be positive or negative, depending on (τ_A, τ_B). If the second term

is negative, then the committed CEO is preferred and $\rho^l = 0$. If the second term is positive, then there exists $\rho^l \in (0,1)$, such that $\pi_f \geq \pi_v$ if only if $\rho \leq \rho^l \leq \rho^h$, where ρ^l is given by

$$0 = \rho^l \left\{ (\tau_A - \tau_B) \left[\underline{\Pi}(\overline{c}) - \overline{\Pi}(\overline{c}) \right] + \underline{\Pi}(\underline{c}) - \overline{\Pi}(\underline{c}) \right\} + (1 - \tau_B) \overline{\Pi}(\overline{c}) + (1 - \tau_A) \underline{\Pi}(\overline{c}) - \underline{\Pi}(\underline{c}).$$

■

References

[1] Angeletos, G., Hellwig, C. and Pavan, A., 2007, "Dynamic Global Games of Regime Change: Learning, Multiplicity and Timing of Attacks." *Econometrica* 75:3, 711-756.

[2] Blanes-i-Vidal, J. and Möller, M., 2007, "When should leaders share information with their subordinates?" *Journal of Economics and Management Strategy* 16:2, 251-283.

[3] Bloom, J., Sadun, R. and Van Reenen, R., 2010, "Does Product Market Competition Lead Firms to Decentralize?" *American Economic Review* 100:2, 434-438.

[4] Bloom, N. and Van Reenen, J., 2010, "Why Do Management Practices Differ across Firms and Countries?" *Journal of Economic Perspectives* 24:1, 203-224.

[5] Bolton, P., Brunnermeier, M. K. and Veldkamp, L., 2008, "Leadership, Coordination and Mission-Driven Management". NBER Working Papers 14339, National Bureau of Economic Research Inc.

[6] Bolton, P., Brunnermeier, M. K. and Veldkamp, L., 2010, "Economists' Perspectives on Leadership." In: Handbook of Leadership Theory and Practice, Section II Chapter 9, 239-263. Boston: Harvard Business School Press.

[7] Burgelman, R. A., 1994, "Fading Memories: A Process Theory of Strategic Business Exit in Dynamic Environments." *Administrative Science Quarterly* 39, 24-56.

[8] Carlsson, H. and van Damme, E., 1993, "Global Games and Equilibrium Selection." *Econometrica* 61, 989-1018.

[9] Dasgupta, A., 2007, "Coordination and Delay in Global Games." *Journal of Economic Theory* 134, 195-225.

[10] Dow, J. and Perotti, E. C., 2010, "Resistance to Change." FEEM Working Paper No. 48.2010.

[11] Ferreira, D. and Rezende, M., 2007, "Corporate Strategy and Information Disclosure." *RAND Journal of Economics* 38:1, 164-184.

[12] Frantz, R., 1992, "X-Efficiency and Allocative Efficiency: What Have We Learned?" *American Economic Review* 82:2, 434-438.

[13] Ghemawat, P., 1991, *Commitment: The Dynamics of Strategy*. New York: Free Press.

[14] Gibbons, R., 2010, "Inside Organizations: Pricing, Politics, and Path-Dependence." *Annual Review of Economics* 2, 337-365.

[15] Harsanyi, J. C., and Selten, R., 1988, *A General Theory of Equilibrium Selection in Games*. Cambridge, MA: MIT Press.

[16] Hart, O. and Holmström, B., 2010, "A Theory of Firm Scope." *Quarterly Journal of Economics* 125:2, 483-513.

[17] Henderson, R. M. and Mitchell, W., 1997, "The Interactions of Organizational and Competitive Influences on Strategy and Performance." *Strategic Management Journal* 18, 5-14.

[18] Henderson, R. M. and Kaplan, S., 2005, "Inertia and Incentives: Bridging Organizational Economics and Organizational Competence." *Organization Science* 16:5, 509-521.

[19] Leibenstein, H., 1966, "Allocative Efficiency and X-Efficiency." *American Economic Review* 56, 392-415.

[20] Raith, M., 2003 "Competition, Risk and Managerial Incentives." *American Economic Review* 93:4, 1425-1436.

[21] Rotemberg, J. J. and Saloner, G. 1994, "Benefits of Narrow Business Strategies." *American Economic Review* 84:5, 1330-1349.

[22] Rotemberg, J. J. and Saloner, G., 2000, "Visionaries, Managers, and Strategic Direction." *RAND Journal of Economics* 31:4, 693-716.

[23] Schmidt, K. M., 1997, "Managerial Incentives and Product Market Competition." *Review of Economic Studies* 64, 191-213.

[24] Stigler, G. J., 1976, "Xistence of X-Efficiency." *American Economic Review* 66:1, 213-216.

[25] Sutton, J., 2012, *Competing in Capabilities: The Globalization Process*. Oxford University Press.

[26] Syverson, C., 2011, "What Determines Productivity?" *Journal of Economic Literature* 49: 2, 326-65.

[27] Van den Steen, E. J., 2005, "Organizational Beliefs and Managerial Vision." *Journal of Law, Economics, and Organization* 21:1, 256-283.