



Paper to be presented at the  
DRUID Society Conference 2014, CBS, Copenhagen, June 16-18

## **Capital Markets, Organizational Adaptation, and the Separation of Ownership and Managerial Control**

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### **Abstract**

The paper contributes to the literature on how capital market pressures impact organizational adaptation. We propose that private and public firms differ in the evaluation and selection of new proposals. The separation of ownership and control in public firm not only creates conflicts of interests, the focus of much of prior work, but even more so leads to differences in the assessment of strategic proposals with uncertain prospects. In a public firm, proposal implementation depends on the agreement of both managers and owners. We explore this mechanism with a NK model, a formal platform widely used in the study of organizational adaptation. Our results confirm the short-term bias of public firms documented in the empirical literature. Public firms tend to improve performance faster than private firms. We also find that public firms exhibit long-term performance advantages in low complexity environments. These results confirm existing empirical results and thereby speak in favor of the external validity of our model. We further find that public firms are more effective in combining local and more distant search, giving rise to adaptive benefits of public firms in highly complex task environments. The adaptive benefits of public companies are further strengthened in environments with strong selection pressures in the product market.

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The present paper contributes to the literature on how capital market pressures impact organizational adaptation. We propose that private and public firms differ in the evaluation and selection of new proposals. The separation of ownership and control in public firm not only creates conflicts of interests, the focus of much of prior work, but even so more leads to differences in the assessment of strategic proposals with uncertain prospects. In a public firm, proposal implementation depends on the agreement of both managers and owners. We explore this mechanism with a NK model, a formal platform widely used in the study of organizational adaptation. Our results confirm the short-term bias of public firms documented in the empirical literature. Public firms tend to improve performance faster than private firms. We also find that public firms exhibit long-term performance advantages in low complexity environments. These results confirm existing empirical results and thereby speak in favor of the external validity of our model. We further find that public firms are more effective in combining local and more distant search, giving rise to adaptive benefits of public firms in highly complex task environments. The adaptive benefits of public companies are further strengthened in environments with strong selection pressures in the product market.

## **Keywords:**

Capital markets, Adaptation, Selection, NK model

## INTRODUCTION

In early 2013, Dell, then the world's third-largest computer maker, announced the plan to take itself private and delist its shares from the stock exchanges in New York and Hong Kong. The intention behind the leveraged buy-out was, according to the business press, "to help it adapt to a technology world in which personal computers, the firm's main business, no longer reign supreme [...] Freed from the constraints of quarterly reporting and having to worry about its share price, the firm should be able to radically restructure its legacy PC business and work hard to boost its revenues from companies looking for cloud computing offerings." (Economist, 2013). By lifting the capital market pressures of being a public company, Dell was thus supposed to be able to change more radically and adapt more effectively to changing market conditions. Indeed, during the same year, retailer Best Buy and smartphone vendor Blackberry also announced plans for going private in order restructure and adapt to the new realities in their industries. These business examples point to an important question: Under what conditions are private firms better able to change and adapt than public firms?

Prior research appears to provide clear evidence on the adaptive properties of private firms. Recent studies documented a bias of public companies in favor of incremental and less exploratory innovations (Wu 2010; Bernstein 2012; Wies & Moormann 2013). Financial analyst coverage of public firms reduces innovation (He & Tian 2013) and constrains adaptation of incumbent firms to technological change (Benner 2010; Benner & Ranganathan 2012). Conversely, formerly public firms that were acquired by private equity funds pursued more explorative, breakthrough patents (Lerner et al. 2011). The literature advances several theoretical reasons for these empirical findings. Public firms suffer from a short-term orientation (e.g. Miller 2002; Graham, Harvey, Rajgopal 2005; Marginson & McAulay 2008), active earning

management reduces R&D spending (Mizik 2010) and non-optimal timing of innovation (Moorman et al. 2012). Likewise, a lower tolerance for failure (Ferreira et al. 2012), managerial entrenchment (Bernstein 2012), and a higher degree of formalization (Wu 2012) promote incremental innovation in public firms. In other words, public firms favor exploitation over exploration (March 1991) to a larger degree than private firms.

Yet, what is considerably less clear is whether the documented bias toward exploitation and incremental innovation restricts adaptation and reduces performance. The literature on organizational adaptation argues that organizations need to balance exploration and exploitation and that the right balance critically depends on the business context in which a firm operates in (e.g. Lavie et al. 2010; Spiegel & Tookes 2009). For example, complex technology development often rewards more exploration (Fleming 2001; Katila & Ahuja 2002, Siggelkow & Levinthal 2003), while stronger selection pressures tend to favor exploitation (e.g. March 1991; Posen & Levinthal 2007). Thus, what is critical for performance is how organizations find and adapt the balance exploration and exploitation, and current literature does not shed light on the question of how (and why) public and private firms differ in that regard. Indeed, the limited empirical evidence on the innovation productivity of public and private firms is mixed: While Chemmanur et al. (2010) and Moorman et al. (2012) suggested that public firms suffer long-term performance losses due to their focus on incremental innovation, Wu (2012) found evidence for the increased innovation productivity of public firms (which implies that private firms may overspend on exploration).

In the present paper, we build theory and develop a simulation model (Davis et al. 2007) to understand how public and private firms differ in their adaptive properties. Prior theoretical contributions stress the separation of ownership and managerial control as the distinguishing

feature of public companies and focus on the ensuing incentive conflicts between owners and managers (e.g. Berle & Means 1932; Ferreira et al. 2012). Our argument is that the separation of ownership and control does not just introduce differences in incentives, but even more so in the assessment of proposals with uncertain prospects. For example, in the case of Dell, Michael Dell, the company's founder and CEO, and major shareholders differed sharply in their assessment of future returns from making major investments into cloud computing services. Differences in opinion about the value of the proposed restructuring probably caused the buy-out to a greater extent than the misalignment of incentives. Private and public firms thereby differ in how new alternatives with uncertain performance consequences are evaluated. In a private firm, it is the owner-manager alone who evaluates an alternative and then decides on its implementation which relevance is supported empirically by Brau (2006) that chief financial officers name decision-making control as a primary reason of choosing the private ownership structure. Conversely, new alternatives in a public firm are subject to additional scrutiny by the capital market, represented either by the (supervisory) board (LaPorta et al. 2000) or by reactions of investors (Schijven & Hitt 2012) and analysts (Benner 2010).

We draw on research in the tradition of Sah and Stiglitz (1985) that links decision-making structures to organizational adaptation and performance (Knudsen & Levinthal 2007; Christensen & Knudsen 2010; Czarar 2010; Reitzig & Sorenson 2013). Because alternatives are subject to additional scrutiny public firms are more selective in the proposals they implement. That is, managers cannot implement proposals that are rejected by owners. This creates an interesting tradeoff between public and private firms: Public firms make fewer errors of commission (implementing a value-reducing alternative) and more errors of omission (rejecting a value-enhancing alternative) than private firms. Greater selectivity creates an organizational

bias toward exploitation, also because more proximate alternatives tend to be easier to evaluate. We analyze this mechanism in an NK model, a platform widely used in the theoretical and empirical study of adaptation (Levinthal 1997; Rivkin 2000; Billinger et al. 2013). Current management research has identified complexity (Levinthal 1997), environmental change (McCarthy et al. 2010), and competitive selection (Hannan & Freeman 1984) as key challenges for organizational adaptation, and the NK model platform allows us to study how these contingency factors impact adaptation and performance. In the present draft, we focus on complexity and competitive selection.

Our results confirm the short-term bias of public firms documented in the empirical literature. Public firms tend to improve performance faster than private firms. We also find that public firms exhibit long-term performance advantages in low complexity environments. These results confirm existing empirical results and thereby speak in favor of the external validity of our model. We further find that public firms are more effective in combining local and more distant search, giving rise to adaptive benefits of public firms in highly complex task environments. The adaptive benefits of public companies are further strengthened in environments with strong selection pressures.

Our results thereby contribute to the current literature in several ways. First, we suggest a parsimonious mechanism to explain many of the existing findings in the empirical literature. Our model focuses on a fundamental difference between public and private firms. Because of the separation of ownership and control, proposals are subject to more scrutiny in public firms. This tends to reduce the rate of innovation (He & Tian 2013) and systematically crowd out more explorative proposals. Obviously, our mechanism is very stylized and abstracts from many real-world complications. For example, managers in public firms with dispersed ownership and

ineffective governance mechanisms may sometimes disregard the differing assessments of owners and analysts (Benner & Ranganathan 2012). Likewise, managers (due to private information or superior evaluation skills) may be better positioned to assess the merits of a proposal than outside observers (Schijven & Hitt 2012). Crucially, these extensions do not invalidate the key mechanism that we propose but rather add important nuances that subsequent research may explore further. Second, our results also explain existing empirical findings, but also allow us to develop new empirical propositions. We find evidence that public firms exhibit a short-term bias and launch more incremental innovations than private firms. However, in terms of innovation performance, our results suggest that public firms may be more effective in balancing exploration and exploitation in task environments that are characterized by a) low or highly complexity (for example, as measured in Lenox et al. 2010) and by b) intense rivalry and selection pressures in the product market.

The rest of the paper is structured as follows. In the following section, we motivate and introduce our simulation model. In section 3 we present our main findings. Section 4 discusses our results in terms of current and future research and concludes.

## **MODEL**

We are interested in understanding the relative adaptive properties of public and private firms. The core theoretical mechanism that we propose is that public and private firms fundamentally differ in their decision-making structures and that these differences shape organizational adaptation. Prior work on organizational adaptation identified environmental complexity and dynamism as a key challenge for organizational adaptation. We therefore draw on the NK model that has evolved into the standard approach to depict task environments differing in complexity

in management research (Levinthal 1997). In the following, we motivate and detail our modeling choices. The model structure consists of four distinct parts: (1) the specification of complex and dynamic task environments, (2) the generation of alternatives by firms, (3) the evaluation of alternatives depending on firm type, and (4) external selection in the product market.

### ***Task environments***

We use the NK model, widely applied in research on organizational adaption, innovation, and strategy, to depict stylized task environments. The NK model specifies task environments as consisting of  $N$  choice attributes that are relevant for performance. The choice attributes often represent the business policy choices of a firm (e.g. Rivkin 2000; Ghemawat & Levinthal 2008). Formally, an alternative consists of a vector  $A$  of choice attributes,  $a_1, a_2, \dots, a_N$ . For simplicity, we assume that each attribute can take on two states, which implies that the landscape consists of  $2^N$  possible alternatives  $A = (a_1, a_2, \dots, a_N)$ . To determine performance  $V$ , the payoff values of an alternative combination is determined by random draws from a uniform distribution  $\sim u[0,1]$ . The performance values of the performance landscape is given by

$$V(A) = [c_1(a_1, a_{-1}) + c_2(a_2, a_{-2}) + \dots + c_N(a_N, a_{-N})]/N.$$

The value of attribute  $a_i$  depends on the attribute itself and  $K$  other attributes. In case of independence ( $K = 0$ ) the individual performance value is not influenced by other attributes. With increasing  $K$ , the interdependence of attributes in the payoff function increases until a maximum of interdependence of  $K = N - 1$ .

### ***Alternative generation***

The economic agents – the firms in the model – navigate the task environment by searching for superior combinations of choice attributes that improve upon the status quo. We consider two modes of alternative generation in our model. First, new alternatives are generated through local search in the neighborhood of the status quo. Local search is the standard search mode in most contributions on organizational adaptation. It captures the bounded rationality of economic agents in complex settings (Ethiraj & Levinthal 2004) and the notion of problemistic search (Cyert & March 1963). Formally, local search is modeled as the perturbation of a single, randomly determined choice attribute of an agent's current configuration. Second, we also allow for the generation of more distant alternatives (Levinthal 1997). Agents may change multiple attributes at the same time. This captures more exploratory search such as the radical restructuring planned by Dell. Empirically, it is well-documented that firms sometimes engage in more radical experimentation with their strategy, especially when they are under distress (Greve 2003). Formally, we follow Levinthal (1997) and capture distant search as a random determination of a new configuration. This corresponds to the notion of long jumps in the literature, because the randomly determined configuration often differs in multiple attributes from the status quo.

### ***Alternative evaluation***

We draw on Knudsen and Levinthal (2007) by introducing a distinction between the generation and the evaluation of a new alternative. New alternatives are generated through a process of local or more distant search as described above. In a second step, they are evaluated vis-a-vis the status quo and only adopted if they improve performance. Crucially, we assume that

the evaluation of the performance outcomes of new alternatives is not perfect, but fallible and subject to human judgment (Sah & Stiglitz 1985; Knudsen & Levinthal 2007; Csaszar 2012). Our central argument is that public and private firms evaluate the same alternative differently, because a public firm features a different decision-making structure.

The private firm consists of a single fallible evaluator layer. The single evaluator represents the private firm's owner-manager who evaluates different alternatives. Insiders have the opportunities to accept an alternative proposal or to reject an alternative proposal. In public firms a second evaluation layer is added to depict the separation of ownership and managerial control. Shareholders with investor sentiments have to evaluate from their perspective decision alternatives that influence public firm's characteristics. In comparison to Knudsen and Levinthal (2007), the public firm decision making structure does represent a two level hierarchical form of organization structure (rejection-oriented). Only alternative proposals that went through two evaluation rounds with acceptances are adopted by the public firm. Put differently, every evaluator has the ability to reject decision proposals.

Individual evaluators distinguish between superior and inferior decision proposals imperfectly. A perfect evaluator could always decide with certainty between a superior and inferior proposal irrespective the size of performance value differences. In practice evaluator are imperfect by a certain degree, which leads to recurring acceptances of inferior alternative proposals. Organizations can suffer from two kinds of errors. They may accept bad, performance-decreasing alternatives and thereby suffer from errors of commission (Type II errors). Conversely, they can also reject good, performance enhancing alternatives and commit errors of omission (Type I errors).

Wrong decisions in form of type I or type II errors are embedded within the model by specifying unbiased (symmetric errors) individual screening functions for evaluators in line with Knudsen and Levinthal (2007). The individual screening function  $f(x) = \alpha x$  is linear in the fitness difference  $x$  between fitness value of current attribute combination and fitness value of proposed attribute combination. The individual screening ability of the single evaluator  $\alpha$  is assumed to produce balanced cases of errors of acceptances of superior alternatives and cases with errors of accepting inferior alternatives. Hence our evaluators with a screening ability of  $\alpha = 10$  reflect some cleverness in evaluation.

Following the general framework of architectures by Christensen and Knudsen (2010) the organizational-level screening function (mathematical depiction of the flow of decisions in an organizational structure) of the private firm  $F_{private}$  represents an individual-level screening function only  $f_{private}(x)$ , where  $x$  again represents the linear screening function. By contrast the decision function of the public firm  $F_{public}$  is an aggregation of two linear screening functions  $f_{private}(x)$  and  $f_{public}(x)$ , which yields a 2-member decision making problem with the organizational-level screening function  $F = f_{private}(x) * f_{public}(x)$ . For simplicity, we assume that screening abilities on individual level screening functions between private and public shareholders are equal  $f_{private}(x) = f_{public}(x)$ , which leads in case of the public firm to an even more simple organizational-level screening function of  $F = f(x)^2$ . Note that this assumption ensures that our results are driven by differences in ownership and control and not by arbitrary assumptions about differences in evaluation ability.

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**Insert Figure 1 about here**  
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### *External selection*

The present study analyzes survival of individual organizations under competition and product-market selection. The total number of organizations in the population is not assumed to stay constant over time. The model includes aspects of population dynamics and niche-based competition. To every organization a survival probability is assigned based on the interrelationship between the current fitness value of the organization and the maximum fitness value observed through the whole population to the point in time. The procedure corresponds to probabilistic survival and selection (Levinthal 1997; Levinthal & Posen 2007). Firms that have a lower survival probability in comparison to a random draw will default and firms with a higher survival probability in comparison to a random draw survive.

## **RESULTS**

In the following, we present the results from the parsimonious model. All results are averages over 250 distinct simulation runs, thereby making sure that all differences are statistically significant. We fix the number of choice attributes in the task environment at  $N = 12$  and we report results for  $K = [1, 2 \dots 11]$ . For each simulation run, we generated a new landscape and then placed 100 organizations of each type (public, private) with a random starting position. For evaluation ability, we assume an individual screening ability of  $\alpha = 10$ . Again, evaluators in

private and public firms do not differ in evaluation ability, only in the decision-making structure. Each simulation runs for 100 time steps.

The results section is structured as follows. To ease exposition, we first detail the main mechanism of our model. Intuitively, public firms should be more conservative in the adoption of newly generated alternatives, because they are subject to additional scrutiny. Public firms should be better at weeding out bad, performance-decreasing alternatives (Type II errors). At the same time, they also suffer from the rejection of more good, performance-enhancing alternatives (Type I errors). To understand this mechanism, we first restrict adaptation to local search and explore the performance implications of the basic mechanism without intermediate selection in the product market. In the next step, we allow organizations to engage in both local and more distant search. We then add selection pressures to the model. Finally, we briefly discuss the robustness of our results to alternative values of  $N$  and evaluation parameter  $\alpha$ .

### ***Type I and Type II errors in public and private firms***

Figure 1 reports the average frequency of Type I and Type II errors for public and private firms for the first 100 time steps of the simulation. Clearly, public firms commit substantially less Type II errors than private firms, especially in the latter stages of the adaptation process. Again, this is because of the added evaluation layer: Managers generate a proposal and then evaluate it. They will only send it on to owners if they think it improves performance, otherwise it will not be send on to the owners in the supervisory board or to analysts in the capital market. Only if owners approve then the alternative will be implemented.

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Our results validate prior insights in organizational adaptation literature such as Knudsen and Levinthal (2007) and by the finance literature on capital markets (Ferreira et al. 2012). Hierarchical organizational structures differ in type I and type II errors. By the separation of ownership and control and the linked differences in the assessment of proposals an interesting tradeoff between public and private firms arises. Consistently through different specifications of complex task environments public firms make fewer errors of commission (type II) and more errors of omission (type I), as depicted in figure 2. Because alternatives are subject to additional scrutiny in case of public firms these companies are more selective in the implemented proposals. Hence public firms tend to be more conservative in alternative evaluation. Moreover the differences in mean variance combinations in implemented alternatives are precisely described by the differences in type I and type II errors, which represent the risk characteristics (less risky) of the tolerance-for-failure mechanism of Ferreira et al. (2012). Furthermore the characteristics of a reduction in innovation and creativity as described by Stuart and Sorensen (2003) after a formalization of organizational design are easily depicted by these confirming results and shed light again on the our central modeling argument that the separation of ownership and control does not just introduce differences in incentives, but even more so in the assessment of proposals with uncertain prospects.

### *Local search and performance in public and private firms*

In the next step, we look at the performance properties of public and private firms (Figure 3). Public firms tend to improve performance faster than private firms, while private firms tend to outperform in the long-term in more complex environments. This supports previous findings in the literature on the short-term bias of public firms, thereby strengthening the external validity out model. Importantly, we do not derive the short-term bias by assuming managerial myopia or misaligned incentives, as in previous literature (Marginson & McAulay 2008), but simply as the outcome of differences in evaluation structures. This result highlights again the conservative assessment of alternatives in public firms, which seems to be advantageous in short-term.

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**Insert Figure 3 about here**  
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We also find that public firms exhibit long-term performance advantages in low complexity environments. With increasing task complexity, the conservative evaluation of alternatives creates a disadvantage in comparison to private firms, which accepts more alternatives. The long-term performance advantage stems from two distinct sources. First, private firms have a higher acceptance rate of good alternatives, which obviously tends to improve performance, but only temporarily. In a stable setting, public firms should eventually catch up, because it simply takes longer for them to realize some of the performance improvements. A good alternative that is rejected will, at a later point, come up for evaluation again (because the search process does not possess any memory). A stable performance advantage for private firms

therefore emerges from the adoption of inferior alternatives, the second source of advantages. While the adoption of an inferior alternative reduces short-term performance, it opens up the potential of long-term performance gains, because it helps private organizations to move off inferior local and reignite search in the landscape. In contrast, because public firms are less prone to make errors of commission, they will stop search sooner and at lower performance values.

This conservative evaluation of innovation proposals leads in the observation of average differences in fitness values to a one-sided U-shape (skew depicted in figure 4). Under the condition of exploitation private firms benefit in high complex environments whereas public firms benefit from low complexity, which already highlights and supports the considerations of Lavie et al. (2010) that the business context is a crucial component in firms' considerations about innovation. The results show that under certain circumstances in an exploitative adaption context the right choice of ownership structure influences performance outcomes of firms significantly. Coming back to the empirical introduction the intended changes in companies' ownership structure within a high complex business sector represented by the technology sector is comprehensible to gain performance advantageous.

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**Insert Figure 4 about here**

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### ***Exploitation, exploration, and performance in public and private firms***

Until now we focused only on exploitative search strategies where organizations are restricted to local search around the status quo alternative. However, it is well documented that

organizations sometimes explore and adopt more distant alternatives and implement radical changes. When we allow for local and more distant search as in Levinthal (1997), our results indicate that public firms benefit relatively more from distant search (Figure 5 and 6). Figure 5 shows that the ability to engage in distant search mitigates the long-term performance disadvantage of public firms in complex environments and even gives rise to a performance benefit in highly complex business settings. This is reinforced by Figure 6 that reports a U-shaped relationship between complexity and the performance of public firms. Public firms dominate over private firms in terms of performance in low ( $K < 4$ ) and very high complexity ( $K > 10$ ) landscapes. These findings are in line with agency considerations of Lehn and Poulsen (1989) that a loose governance structure is counterproductive to value creation, which plays a significant role for companies with high undistributed cash flows.

Furthermore these findings shed additional light on the mixed empirical findings on the innovation performance of public and private firms. Chemmanur et al. (2010) investigated U.S. manufacturing firms (electronic and industrial machinery and metal industry) and Moorman et al. (2012) studied consumer packaged goods sector, which are comparable to median complex industries. They found innovation performance benefits of private firms in these settings. In contrast, Wu (2012) analyzed U.S. medical device firms and found benefits for public firms. Medical devices are high tech, high complexity products. In addition, the idea that private firms may overspend on exploration can be derived from our results.

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### *Competitive selection pressures and performance*

Adding external selection to our parsimonious model leads to a further strengthening of the adaptive benefits of public companies. Figure 7 reports results for a setting in which public and private firms compete in the same task environment (identical landscape) and where selection and survival depends on the current performance (fitness) of a given organization. The task environment segment in which public firms dominate private firms adaptive power expands from previously  $K < 4$  and  $K > 10$  to strict dominance. Strong selection pressures in product-markets signal that companies have to improve early their business performance to survive. Hence the advantage of short-termism of public firms gets under external selection pressure more valuable and increases therefore the probability of public firms to survive at very early competition stages. Thereby short-termism adds a long-term positive component for public companies in high and low to medium competitive contexts. The results of external selection add another important aspect to our conclusion. Beside the recognition of task environment complexity business contexts include the competitive selection as another determinant for firms conditions that influence their ability to adapt. Coming back to our introductory example of Dell

the decision of taking the company private radical changes with high effectiveness is counterintuitive looking at the presented results with emphasis on the business context.

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**Insert Figure 7 about here**  
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### ***Robustness***

We also tested how robust the qualitative results are to different specifications of key parameters of the model. Changing the N does not change our principal results, but fewer performance-relevant choice parameters (lower N) shifts the relative benefits toward private firms (because smaller search spaces reward more sustained, failure-induced exploration), while public firms benefit from a larger (higher N) search space (because they tend to punish failure more and reward reliability). Likewise, different value of  $\alpha$  (evaluation ability) do not change our results as long as the evaluation of new alternatives is imperfect. At the limit of perfect evaluation, public and private firms become indistinguishable and the decision-making structure irrelevant for organizational adaptation. Thus, an important boundary condition for our results is that the evaluation of new alternatives is not trivial. This appears to be true in many, if not most, business settings.

Overall, the simulation model, which captures the differences in decision-making structures in private and public firms, sheds light on a manifold of results with significant differences in organizational adaptation properties. Our results confirm well known empirical findings with external validity represented by short-term bias of public firms and that public

firms exhibit long-term performance advantages in low complexity environments under exploitation. Public firms are more effective in combining exploitation and exploration giving rise to adaptive benefits of public firms in highly complex task environments. The adaptive benefits of public companies are further strengthened in environments with strong selection pressures in the product market.

## **DISCUSSION AND CONCLUSIONS**

Our results contribute to the current literature in several ways. First, we suggest a parsimonious mechanism to explain many of the existing findings in the empirical literature. Our model focuses on a fundamental difference between public and private firms, the separation of ownership and managerial control (Berle & Means 1932). In contrast to prior literature on the topic, we abstract from the conflict of interest between owners and managers. There is no doubt that they are important, but they have been studied elsewhere. Rather, our core argument is that the separation also may introduce differences in the assessment of strategic proposals with uncertain performance consequences. Because of the separation of ownership and control, proposals are subject to more scrutiny in public firms. This tends to reduce the rate of innovation (He & Tian 2013) and systematically crowd out more explorative proposals. Obviously, our mechanism is very stylized and abstracts from many real-world complications. For example, managers in public firms with dispersed ownership and ineffective governance mechanisms may sometimes disregard the differing assessments of owners and analysts (Benner & Ranganathan 2012). Likewise, managers (due to private information or superior evaluation skills) may be better positioned to assess the merits of a proposal than outside observers (Schijven & Hitt

2012). Crucially, these extensions do not invalidate the key mechanism that we propose but rather add important nuances that subsequent research may explore further.

Second, our results also explain existing empirical findings, but also allow us to develop new empirical propositions. We find evidence that public firms exhibit a short-term bias and launch more incremental innovations than private firms. However, in terms of innovation performance, our results suggest that public firms may be more effective in balancing exploration and exploitation in task environments that are characterized by a) low or highly complexity (for example, as measured in Lenox et al. 2010) and by b) intense rivalry and selection pressures in the product market. The innovativeness of private firms, caused by the lower selectiveness, becomes a drawback in low and highly complex environments, because they are prone to dislodging good solution. While this may sometimes reveal superior alternatives, it usually turns out to be detrimental to performance. Performance in private firms therefore is less reliable and this becomes a liability in highly competitive environments (Hannan & Freeman 1984). Conversely, medium complexity environments reward sustained exploration and an increased tolerance for failure often pays off in terms of long-term performance.

The practical relevance of our results is given by the fact that firms' managers can influence the adaptive properties of the firm by changing the ownership structure based on considerations about the business context. Depending on the task environment complexity and competitive selection pressure firm managers can steer the adaptive properties and hence influence firms' performance significantly.

To conclude, the present paper intends to contribute to our understanding of the link between capital markets and organizational adaptation by unpacking a mechanism which we think is central to this endeavor, the separation of ownership and managerial control. In contrast

to prior research, we highlighted how the separation introduces differences in opinions, and analyzed the implications of this idea with a stylized simulation model. The model allows us to derive a set of results that appear to be consistent with the existing empirical evidence, while at the same time pointing to new contingency factors such as complexity and selection pressures that future empirical work could look into. Admittedly, our model is quite abstract and disregards many of the real-world complications. For example, the relationship between the top management team in a public firm and financial analysis is considerably more nuanced (e.g. Benner 2010). Obviously, private firms may also feature additional decision-making layers, such as startup firms with considerable venture capitalist involvement. Likewise, top management may possess private information about the value of a new alternative, which makes them more competent in alternative evaluation. Importantly, while these considerations add additional layers of analytical complexity and make the model considerably more realistic, they do not invalidate the core mechanism that we propose in the present paper. Rather, they offer the potential of extending, refining, and qualifying the results reported in the current draft. The proposed model offers a theoretical platform that may be useful in addressing these important considerations. We leave them for further research.

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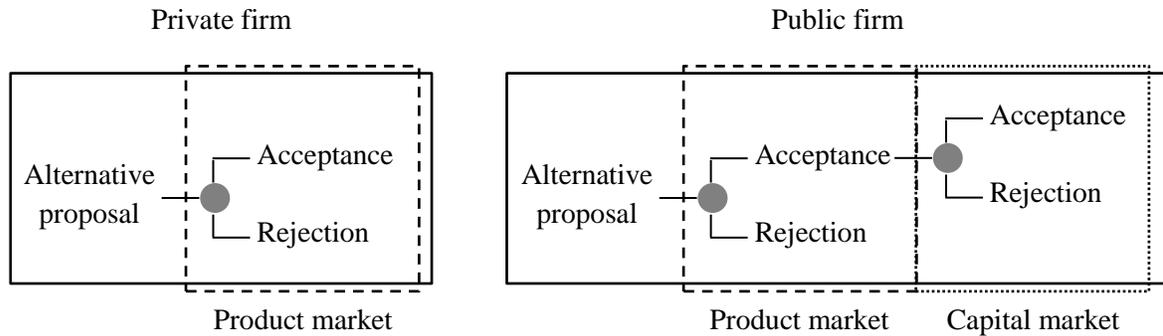
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## APPENDIX

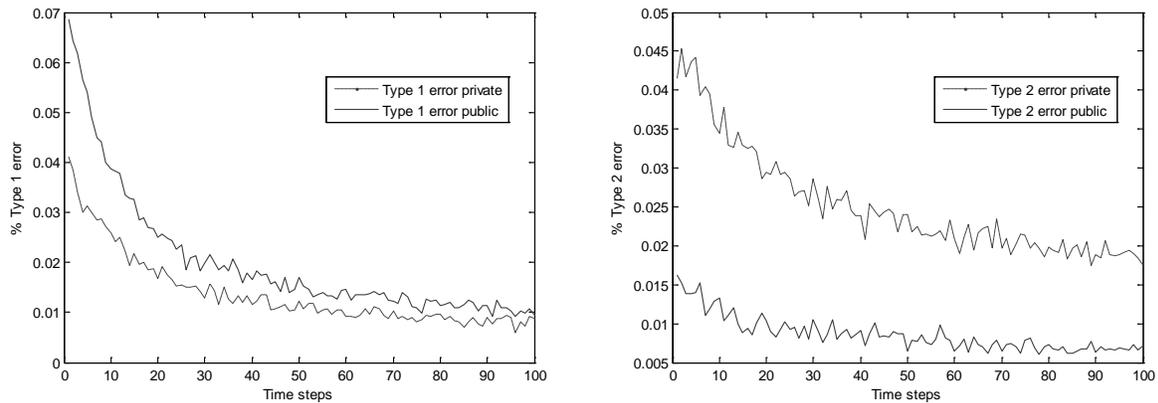
**Figure 1: Flow of Decisions in private firm with one evaluator and in public firm with two evaluators**



*Notes. In each of the two different organizational structures, alternative proposals enter the decision making progress at the left and flow from the left to the right. Dots represent decision evaluation with acceptance or rejection of alternative proposals. Alternative proposals that are accepted by every evaluation layer represented by dots (product market and capital market) are implemented by the organization.*

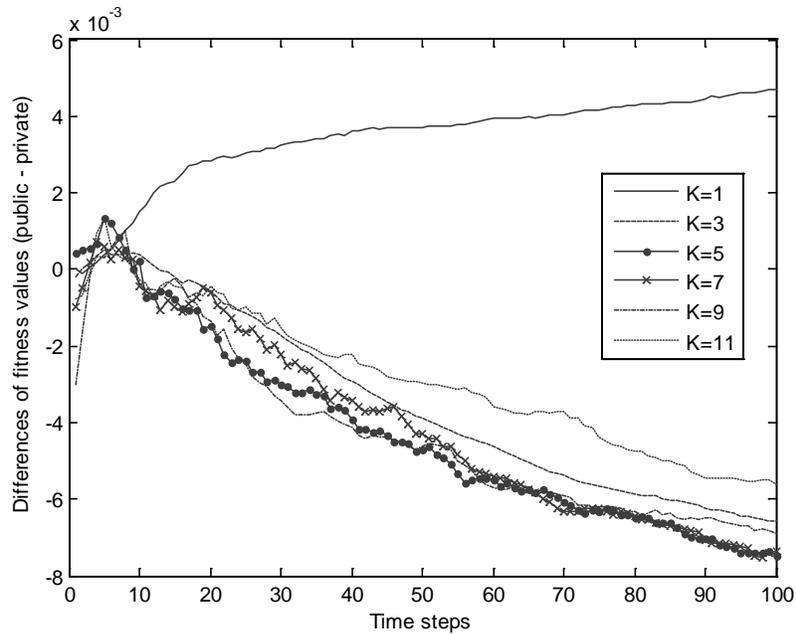
**Figure 2: Average frequencies of Type I and Type II errors for a representative complex task environment of private and public firms ( $N = 12$ ,  $K = 6$ ,  $\alpha = 10$ , Local Search**

**Adaption)**



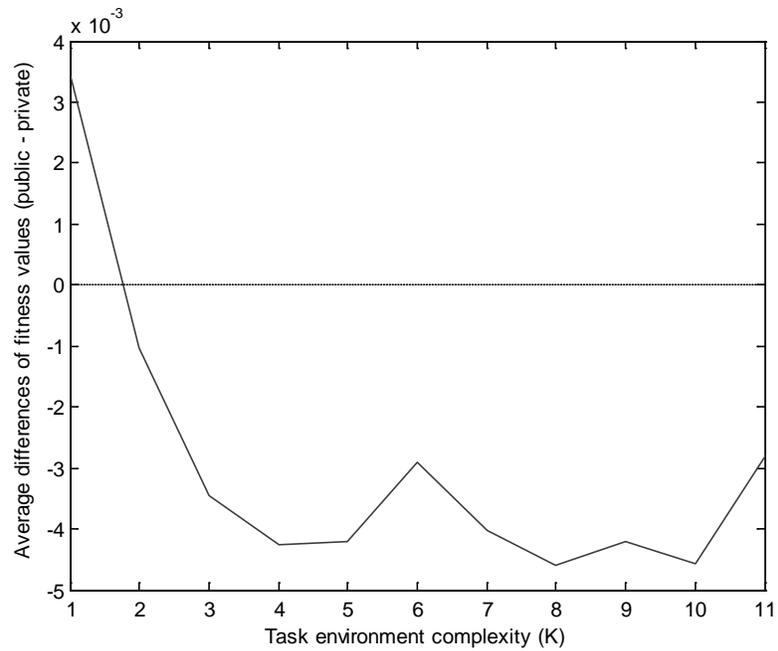
*Notes. Average frequencies of type I errors for one representative complex task environments ( $K=6$ ) is depicted to the left. Average frequencies of type II errors for one representative complex task environments ( $K=6$ ) is depicted to the right. Base simulation comprises 250 simulations for 100 organizations in  $N$  12 landscape for every single  $K$  through 100 time steps.*

**Figure 3: Differences in fitness values of private and public firms with short-term bias in public firms ( $N = 12$ ,  $K = [1, 3, 5, 7, 9, 11]$ ,  $\alpha = 10$ , Local Search Adaption)**



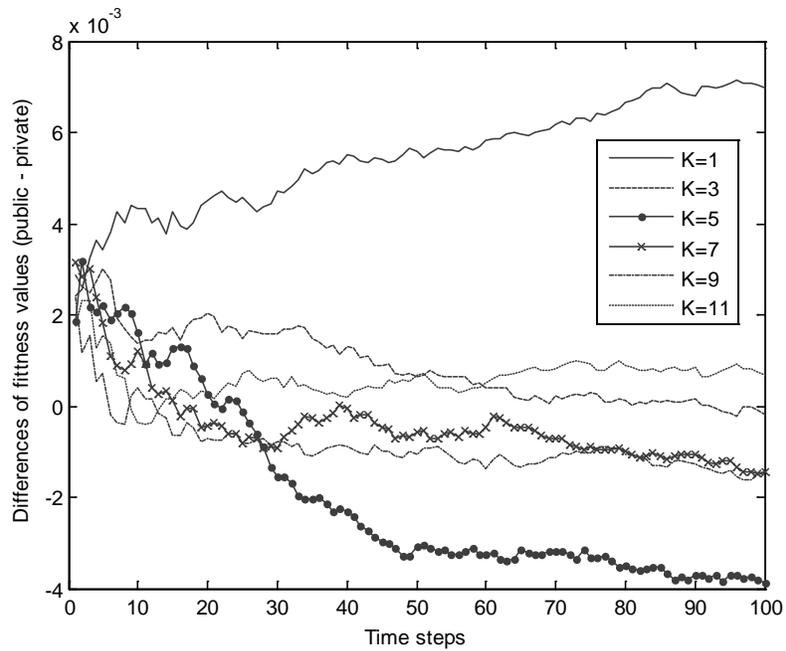
*Notes. Average differences of fitness values between public and private firms for different complex task environments shaded with different lines. Base simulation comprises 250 simulations for 100 organizations in N 12 landscape for every single K through 100 time steps.*

**Figure 4: Average differences in fitness values of private and public firms with long-term performance advantage of public firms in low complex environment (Local Adaption)**



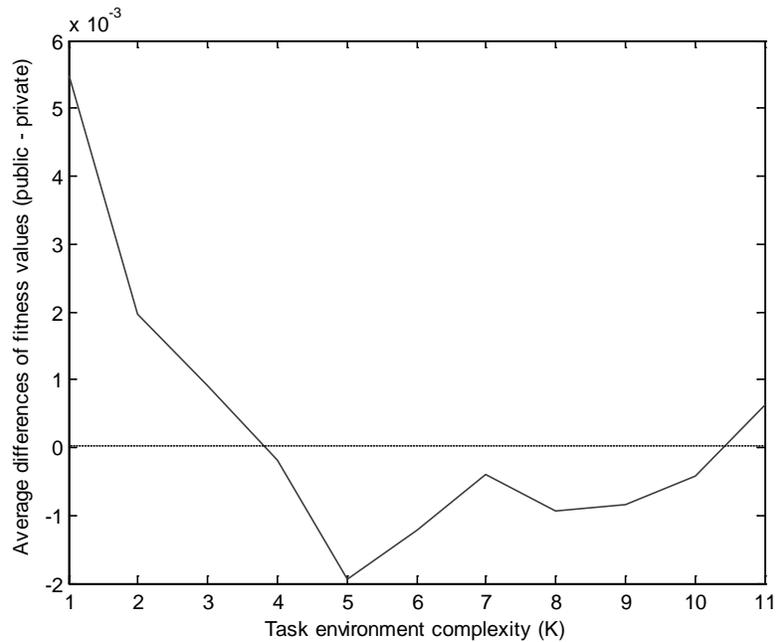
*Notes. Average differences of fitness values between public and private firms for different complex task environments shaded with different lines. Base simulation comprises 250 simulations for 100 organizations in N 12 landscape for every single K through 100 time steps.*

**Figure 5: Differences in fitness values of private and public firms with benefit for public firms (Local and Random Adaption)**



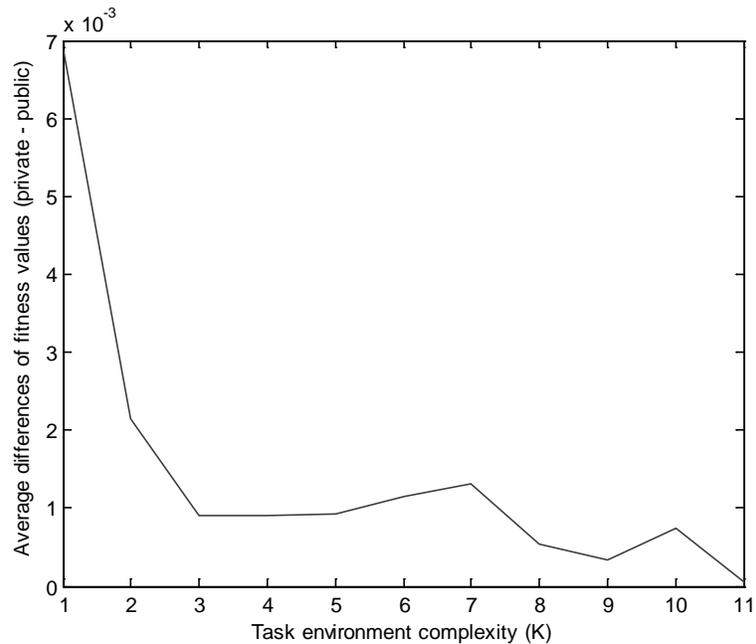
*Notes. Average differences of fitness values between public and private firms for different complex task environments shaded with different lines. Base simulation comprises 250 simulations for 100 organizations in N 12 landscape for every single K through 100 time steps.*

**Figure 6: Average differences in fitness values of private and public firms with long-term performance advantage of public firms in low and high complex environments (Local and Random Adaption)**



Notes. Average differences of fitness values between public and private firms for different complex task environments shaded with different lines. Base simulation comprises 250 simulations for 100 organizations in N 12 landscape for every single K through 100 time steps.

**Figure 7: Average differences in fitness values of private and public firms with long-term performance advantage of public firms in low and high complex environments under selection (Local and Random Adaption with External Selection)**



*Notes. Average differences of fitness values between public and private firms for different complex task environments shaded with different lines. Base simulation comprises 250 simulations for 100 organizations in  $N=12$  landscape for every single  $K$  through 100 time steps.*