Rent-Seeking vs. Hazard-Reducing Political Strategies: A Simple Theoretical Model

Nan Jia

Rotman School of Management, University of Toronto

105 St. George Street, Toronto, ON, Canada, M5S 3E6

March 24, 2009

Abstract

In this paper, I develop a theoretical model to address the question of which firms invest more in political strategies. In particular, I examine whether it is stronger competitors (i.e., firms with greater market capabilities, the ability to succeed in market competition) or weaker firms that invest more in political strategies to reduce the hazards of public and private expropriation. Prior research has focused primarily on rent-seeking political strategy, arguing that weaker firms are more likely to use political strategies to seek refuge from competitive forces; however, when political strategy helps firms to safeguard their market production, intuition suggests that stronger competitors should stand to benefit from it. In this paper I develop a theoretical model that reveals how a firm's market capabilities affect key tradeoffs in allocating resources between market and non-market activities (i.e., political strategies). My main finding is that, when political strategies are used to reduce the hazards of public and private expropriation, stronger competitors will invest more in political strategies than weaker firms. In extensions of the basic model, I also show that, when both rent-seeking and hazard-reducing political strategies are present, less capable firms invest in rent-seeking political strategies while more capable firms invest in hazard-reducing political strategies.

Acknowledgement: I thank Kenneth Corts, Joanne Oxley, and Guy Holburn for helpful comments.

1. INTRODUCTION

Political strategy, with which firms seek to influence political decisions and policy making, has long been recognized as an important determinant of firm value (e.g. Fisman, 2001), and confers benefits to firms in a variety of ways. For instance, politically active firms may lobby for trade protection, pursue preferential treatment by government-owned business partners, seek regulatory help to ward off erosion of market share, and seek government bailouts (e.g., Lenway, et al., 1996; Schuler, 1996; Hillman and Hitt, 1999; Faccio et al, 2006). A common theme in the previous literatures is that firms pursue these political strategies for rent-seeking purposes, that is, firms use political strategy to ensure their competitive advantage or survival mainly by shielding themselves from competitive forces or neutralizing their competitors' advantageous positions, which generate gains for firms through the redistribution of wealth. An important implication is that "weaker" firms which are less able to survive in market competition are more likely to pursue rent-seeking political strategy than stronger competitors, because weaker firms tend to have greater comparative advantage in obtaining government intervention and insulation from competitive forces, rather than competing in market competition. Lenway et al. (1996), for example, show that firms that lobby in the U.S. steel industry tend to be less profitable than non-lobbyers. Morck et al. (2001) also show that innovative firms in the steel industry are less politically active than industry laggards. Studies in other industries provide additional evidence that U.S. companies whose survival is threatened by the entry of international competitors turn to the government for trade protection (For example, see Cashore (1997) on softwood producers and Baron (1995b) on the cement industry). Moreover, rent-seeking political strategy is often deemed as inconsistent with other value-creating market strategies (Leuz and Oberholzer-Gee, 2006).

However, anecdotally researchers are starting to notice that political strategy may not be solely rent-seeking. For instance, Li et al. (2006) finds that Chinese private entrepreneurs enter politics to improve contract enforcement which is generally weak in the legal system and to reduce the likelihood of state predation, and Hellman et al. (2003) document that in some East European transitional economies firms with better access to officials are more able to ensure fair legal protection against transgression.

These are specific examples of a common phenomenon that firms in emerging economies, facing inadequate legal protection of their private properties, use political strategy to protect their market production from the hazards of expropriation. In contrast to rent-seeking political strategy, such "hazard-reducing political strategy" creates value for firms not through the redistribution of wealth, but through safeguarding value-creating market production and entrepreneurial activities.

This paper aims at demonstrating that the distinction of political strategy of hazard-reducing purposes generates a different answer, compared with previous research focusing mainly on rent-seeking purposes, to the question of "which firms are more likely to pursue political strategy," and an different implication of the relationship between political strategy and market strategies. Specifically, by developing a formal model to examine the tradeoffs involved in deciding on market production, investment in efficiency-enhancing market strategy, and investment in political strategy, I demonstrate that it is the stronger competitors, rather than the weaker ones, that have greater incentives to invest in *hazard-reducing political strategy*. In addition, hazard-reducing political strategy and productive market strategies are complements rather than commonly-held substitutes. Moreover, I show that the answer to the question of which firms invest more in *rent-seeking political strategy* may be more complicated than what the conventional wisdom suggests. When political strategy generates rents that are unrelated to a firm's market activities, then weaker competitors indeed invest more in rent-seeking political strategy; however, if a rent-seeking political strategy confers rents to the firm in a way that leverages the firm's market activities, then this conclusion may not stand. The findings suggest that the answer to this question hinges on the specific way in which a political strategy confers rents to firms.

To foreshadow the basic model, consider a firm's decision to allocate resources to a hazard-reducing political strategy and an efficiency-enhancing market strategy. Assume that for the representative firm, when its production and sales are completed, a proportion of its profit is expropriated by a predatory government or private entities; the percentage of profit that the firm is able to retain is determined by both the quality of the market-supporting institutional environment and the firm's political influence that its political strategy generates. Investing in efficiency-enhancing market strategy lowers the firm’s production costs. Consider a two-stage decision: in the first stage, in order to maximize its expected retained profit, the firm invests in a hazard-reducing political strategy to reduce expropriation, and in an efficiency-enhancing market strategy to decrease its production costs; in the second stage, given the pre-determined level of expropriation and production costs, the firm produces an optimal quantity to maximize profit as a price-taker. I first solve for the optimal investment in the political strategy and that in the market strategy using backwards induction, and then conduct comparative statics to examine the relationship between the two investments and how they vary with the firm’s market capabilities. I use “market capabilities” to describe the firm’s abilities to succeed in market competition (a distinction of “stronger” and “weaker” firms), and the firm’s market capabilities are indicated by a production efficiency parameter that affects the production cost.

The basic model shows that investments in the hazard-reducing political strategy and the efficiency-enhancing market strategy are complements; moreover, stronger competitors (i.e. firms with greater market capabilities) invest more in both the hazard-reducing political strategy and the efficiency-enhancing market strategy than weaker competitors. In addition, when the institutional environment becomes more adverse, firms invest more in the hazard-reducing political strategy, but less in market strategy under certain circumstances.

I next examine two variations of the basic model. The first extension is to introduce heterogeneous expropriation hazards (i.e., firms with different market capabilities face different generic expropriation hazards) and the basic results still hold. The second extension imposes a budget constraint on the total investment in the hazard-reducing political strategy and the efficiency-enhancing market strategy, the intention being to check if the positive relationship between the firm’s market capabilities and the investment in hazard-reducing political strategy is solely driven by the complementary relationship between the hazard-reducing political strategy and the efficiency-enhancing market strategy. In the second variation, firms with greater market capabilities still invest more in the political strategy, showing that the main result is not driven only by the complementary relationship of the two strategies.

I also consider rent-seeking political strategies in the place of hazard-reducing political strategy. I first assume that a rent-seeking political strategy benefits the firm in a way that is unrelated to the firm's production in the market, such as a lump-sum subsidy whose amount is unrelated to the firm's market production. In this setting, I find that firms with *lower* market capabilities turn out to invest more in the non-production-related rent-seeking political strategy, consistent with the arguments of previous studies. I also note that if rent-seeking political strategy is related to the firm's market activities (e.g., by increasing the product's price), then firms with greater market capabilities may invest more in rent-seeking political strategy, and thus the results for market-related rent-seeking political strategy are similar to those for hazard-reducing political strategy. Overall, these results partially support the conventional wisdom but suggest that we need more scrutiny of the specific forms of rents in order to understand which firms participate most in political activities.

Finally, I examine the firm's investment decisions when both rent-seeking political strategy (unrelated to production) and hazard-reducing political strategy are present, and the results suggest that, facing the choice of investing in both types of political strategies, more capable firms invest more in the hazard-reducing political strategy whereas less capable firms invest more in the rent-seeking political strategy. This is an interesting and important result; it not only confirms the intuition that firms of different market capability prefer different types of political strategy but also extends our understanding of the nature of political strategy by revealing the tradeoffs of investing in different political strategies.

Section 2 lays out the exposition of a simple model on the investment in the hazard-reducing political strategy and the market strategy, and generates the basic results (Propositions 1 to 6). Section 3.1 and 3.2 consider two variations of the basic model. Section 4.1 and 4.2 extend the models to consider a type of rent-seeking political strategy and generate some new results (Propositions 7 and 8). Section 5 concludes.

2. A SIMPLE MODEL

I propose a simple model where a representative firm first chooses to invest in a market strategy that enhances its production efficiency and a political strategy that reduces the hazards of state predation of it profits, and then engages in market production. I focus on examining which firms, in terms of their market capabilities, are more likely to engage in the political strategy and the market strategy. This model demonstrates the main point of the paper, which is that the firm's investment in hazard-reducing political strategy and market strategy is different for firms of different levels of market capabilities.

2.1 Demand

Assume that the firm is a price taker and faces an exogenously determined price $p > 0$; without loss of generality, assume $p = 1$. The price-taking assumption simplifies the analysis of the firm's production decision but does not weaken the key message that the basic model intends to convey.

2.2 Cost and Production

Assume that the firm faces the following cost function (2.1).

(2.1) $C_M(q) = \frac{1}{2}cq^2 + (1-e)q$, where $q > 0$, $0 < c \leq 1$ and $0 \leq e \leq 1$.

Variable q denotes production quantity, the choice variable for the firm at the production stage. This assumption yields diminishing returns, i.e., $\frac{\partial C_M(\cdot)}{\partial q} = cq + 1 - e > 0$ and $\frac{\partial C_M^2(\cdot)}{\partial q^2} = c > 0$ to ensure interior solutions. The parameter c denotes (inversely) the firm's "market capabilities" which lower production costs, i.e., $\frac{\partial C_M(\cdot)}{\partial c} > 0$; in addition, c is fixed for each given firm. Specifically, the parameter c may be interpreted in two ways: it could indicate an "entrepreneurial factor" in the underlying production function and reflects the value of the firm's entrepreneurial quality that adds value in its production; alternatively, it could also capture the firm-level heterogeneity that affects production efficiency in the underlying production function – because not all firms may reach the production frontier, c is a firm-specific parameter in the cost function, reflecting the production efficiency. Variable e denotes the level of the firm's investment in the market strategy that affects the firm's production costs, and I offer more detailed discussion in the next subsection.

Based on the assumptions on the demand and the costs, the firm's profit function is

(2.2) $\pi_M = pq - C_M(q) = q - \left[\frac{1}{2}cq^2 + (1-e)q\right]$

2.3 Market Strategy

Variable e in the cost function (2.1) is a determinant of the firm's production costs: a firm with a smaller e is a less efficient producer with higher marginal and average costs. I assume that e indicates the firm's investment in an efficiency-enhancing market strategy such as innovation which contributes to the firm's market success by lowering its production costs. Moreover, I assume that the firm's market capabilities and its investment in the market strategy are independent $\frac{\partial C_M^2(\cdot)}{\partial c \partial e} = 0$; that is, firms of any level of market capabilities are equally capable of making market investment e, and with the same level of investment in e, firms lower their production costs by the same amount.

I assume quadratic costs of the efficiency-enhancing market strategy to ensure net benefit concavity and hence interior solutions $C_e(x) = \frac{1}{2}x^2$ where $x = e^2$; with this assumption, choosing the investment level of e amounts to choosing a value for x, and this assumption exists for computational simplicity in the basic model.

2.4 Expropriation Hazards and Hazard-Reducing Political Strategy

Expropriation occurs when the government or private parities illicitly claim a portion of firms' realized profits. I assume that the expropriation hazards are proportional to the firm's expected profit; the firm can retain a percentage *H* of its profit, and *(1-H)* is the percentage of expected profit expropriated by a predatory government or private entity. Assume that the percentage of profit retained by the firm is

(2.3) $H = 1 - h(1-r)$ where $0 \leq h \leq 1$ and $0 \leq r \leq 1$.

Parameter h denotes the generic hazards in the institutional environment, created by institutional conditions such as how well property rights are protected and how well the government is constrained, and a larger h indicates that the institutional environment is of poorer quality, leading to a greater likelihood of expropriation occurring $\frac{\partial H(r,h)}{\partial h} = (1-r) < 0$. Variable r is the firm's investment in the hazard-reducing political strategy which helps the firm reduce the expropriation hazards and retain a greater proportion of its profit $\frac{\partial H(r,h)}{\partial r} = h > 0$.[1] Note that I make a conceptual distinction between the "generic hazards" (h) induced by the hazard-prone institutional environment and the final "expropriation outcome" $H(r,h)$, since the latter composes of not only generic hazards but also the firm's investment in the political strategy that may reduce expropriation.

Therefore, the total profit that the firm retains is

(2.4) $R_T = H \cdot \pi_M = [1 - h(1 - r)] \cdot \{q - \left[\frac{1}{2}cq^2 + (1 - e)q\right]\}$

The hazard-reducing political strategy is not cost free either. Assume its cost is $C_r(r) = \frac{\alpha}{2}r^2$ where $\alpha > 0$; α reflects how costly the investment in the hazard-reducing political strategy is relative to that of the efficiency-enhancing market strategy.

2.5 Timing

The firm's decisions are modeled as a two-stage decision tree. In the first stage, the firm chooses to invest in the efficiency-enhancing market strategy (e) and the hazard-reducing political strategy (r); in the second stage, given the value of e and r, the firm produces to maximize its profit. I assume a two-stage decision because the firm's main concern when making investments in the political strategy and the market strategy is how these strategies affect its expected future profit; moreover, the firm's existing investment in the market strategy affects its cost function and thus the decision of the production quantity.

The second-stage profit maximization problem is to optimize equation (2.2) by choosing q, given the levels of c and e:

(2.5) $\max_{\{q\}} \pi_M = q - \left[\frac{1}{2}cq^2 + (1 - e)q\right]$

Denote the optimal profits of (2.5) as $\pi_M^*(c, e)$.

[1] Assumption (2.3) also implies that $\frac{\partial^2 H(r,h)}{\partial h\, \partial r} = 1 > 0$, which means that the effectiveness of a given political strategy increases as the institutional environment becomes more adverse. It is reasonable because the government's discretion and power, which increases the hazards of state predation, also provides more opportunities for firms to use political strategy to influence on the government for private ends.

In the first stage, the firm chooses its investments in the market strategy and the political strategy, given the expected profit from the second-stage production $\pi_M^e = \pi_M^*(c,e)$.

(2.6) $\max_{\{r,x\}} \pi_{T1} = R_T - C_r(r) - C_e(x) = [1 - h(1-r)]\,\pi_M^e - \frac{\alpha}{2}r^2 - \frac{1}{2}x^2$

2.6 Solutions of the Basic Model

The second stage profit maximization problem (2.5) yields an optimal production quantity $q^* = \frac{e}{c}$, therefore, the optimal second-stage profit is $\pi_M^*(c,e) = \frac{e^2}{2c}$. Since $x = e^2$, choosing the investment in the market strategy *e* amounts to choosing a value for x, and in the notation of x, $\pi_M^*(c,x) = \frac{x}{2c}$.

In the first stage (2.6), given $\pi_M^* = \frac{x}{2c}$, the firm decides on the investment in x (equivalent to e) and r. To ensure positive solutions, assume that $4\alpha c^2 - h^2 > 0$, that is, the market strategy is not too costly relative to the political strategy, or the generic hazards in the institutional environment are not too high. Let $\{r_1^*, x_1^*\}$ denote the equilibrium solutions.

Appendix 1 shows that $r_1^* = \frac{h(1-h)}{4\alpha c^2 - h^2}$, $x_1^* = \frac{2\alpha c(1-h)}{4\alpha c^2 - h^2}$ (and $e_1^* = \sqrt{x_1^*}$). The result of the relationship between the equilibrium investments in the market strategy and the political strategy generates Proposition 1; $x_1^* = \frac{2\alpha c}{h} r_1^*$ indicates that the correlation between the optimal investment in the market strategy and that in the hazard-reducing political strategy is positive, suggesting that the need of curing expropriation hazards and that of enhancing production efficiency are related, and thus the market strategy and the hazard-reducing political strategy are complements instead of commonly-assumed substitutes. Therefore,

Proposition 1*: The investment in the hazard-reducing political strategy and that in the efficiency-enhancing market strategy are complements.*

I conduct the following comparative static exercises at the equilibrium $\{r_1^*, x_1^*\}$. First, $\frac{\partial r_1^*}{\partial c} < 0$ indicates that firms with greater market capabilities invest more in the hazard-reducing political strategy. Intuitively, this is because the marginal return of the hazard-reducing political strategy is higher for firms with greater market capabilities ($\frac{\partial^2 R_T^*}{\partial r \partial c} < 0$) whereas the marginal cost of the political strategy is invariant to market capabilities ($\frac{\partial^2 C_r^*}{\partial r \partial c} = 0$). To further explore the intuition of why the marginal return of the political strategy decreases with the firm's market capabilities, I decompose the effect of market capabilities on the marginal return of the political strategy ($\frac{\partial^2 R_T^*}{\partial r \partial c}$) into two parts: (a1) a direct effect – holding the investment in the market strategy constant, a more capable firm accrues greater benefits from a decrease in the level of expropriation and thus gains a higher return from the political strategy investment, since it has a greater value at risk of expropriation; and (a2) an indirect effect – a more capable firm also invests more in the efficiency-enhancing market strategy (I present the proof in Proposition 5), which further increases its value at risk of expropriation and its incentive to invest in the hazard-reducing political strategy. Therefore,

Proposition 2*: Firms with greater market capabilities invest more in hazard-reducing political strategy than less capable firms.*

Second, $\frac{\partial r_1^*}{\partial h} > 0$ indicates that a more hazard-prone institutional environment induces a higher level of investment in the hazard-reducing political strategy. Intuitively, this is because a more adverse institutional environment generates a higher marginal return of the political strategy ($\frac{\partial^2 R_T^*}{\partial r \partial h} > 0$), while the marginal cost of the political strategy is invariant to the institutional environment ($\frac{\partial^2 C_r^*}{\partial r \partial h} = 0$). Note that the effect of the institutional environment on the marginal return of the political strategy ($\frac{\partial^2 R_T^*}{\partial r \partial h}$) can also be decomposed into two parts: (b1) a direct effect – holding the investment in the market strategy constant, since the generic expropriation hazards constitute the return of the political strategy that shape the expropriation outcome ($\frac{\partial H}{\partial r} = h$), a higher level of generic hazards increases the marginal return of the political strategy, and (b2) an indirect effect. The sign of the indirect effect may be either positive or negative (I present the proofs in Proposition 6), depending on how the investment in the market strategy changes with the level of generic hazards: when the generic hazards become more severe, if the investment in the market strategy increases, then the value at risk of expropriation and the marginal return of the political strategy would be even greater; however, if the investment in the market strategy decreases in a more adverse institutional environment, the indirect effect would be negative. Appendix 1 shows that the total effect of (b1) and (b2) is positive. Therefore,

Proposition 3*: Firms invest more in hazard-reducing political strategy when the institutional environment is more hazard-prone.*

I also examine interaction effects. Hypothetically, $\frac{\partial^2 r_1^*}{\partial h \partial c} < 0$ would suggest that the positive relationship between the firm's market capabilities and its investment in the hazard-reducing political strategy is stronger if the institutional environment induces greater generic expropriation hazards; in other words, the "gap" between the amount of investment in the political strategy made by a more capable firm and that by a less capable one widens in a more adverse institutional environment. The results show that $\frac{\partial^2 r_1^*}{\partial h \partial c} < 0$ if and only if $(4\alpha c^2 + h^2)(2h - 1) - 2h^2 < 0$, therefore, sufficient conditions for $\frac{\partial^2 r_1^*}{\partial h \partial c} < 0$ include: 1) $h \leq \frac{1}{2}$, indicating that generic hazards are sufficiently high, or 2) if $h > \frac{1}{2}$ but αc^2 is sufficiently small, indicating that the cost of the political strategy is sufficiently low relative to that of the market strategy, and the firm's market capabilities are sufficiently high.

Intuitively, although the marginal cost of the political strategy is invariant to the institutional environment and the firm's market capabilities, the "gap" between the marginal return to the political strategy for a more capable firm and that for a less capable one may or may not widen in a more adverse institutional environment, which causes the sign of $\frac{\partial^2 r_2^*}{\partial h \partial c}$ to be indefinite. This is due to some countervailing effects. Two effects contribute to a negative sign: first, because an increase in the generic hazards directly results in a higher percentage of profit being expropriated, and given that a more capable firm has a greater value at risk of expropriation, an increase in the generic hazards leads to a greater increase in the amount of potential expropriation for a more capable firm than for a less capable one; in addition, since a more capable firm also tends to invest more in the market strategy (for proofs see Proposition 5) which further adds to its value at risk of expropriation, an increase in the generic hazards enhances a capable firm's incentives of investing in the political strategy more than a less capable one's. However, there also exist two countervailing effects contributing to a positive sign: first, if adverse institutional environment discourages the investment in the market strategy ($\frac{\partial x_1^*}{\partial h} < 0$ holds under conditions specified in Proposition 6), then it reduces the value at risk of expropriation and thus weakens the incentives of investing in the political strategy for all firms; additionally, though a more capable firm tends to invest more in the market strategy (see Proposition 5), such incentive weakens in a more adverse institutional environment, and since lowered investment in the market strategy reduces the value at risk of expropriation, it in turn lowers the incentive to invest in the political strategy. Appendix 1 shows how $\frac{\partial^2 r_2^*}{\partial h \partial c}$ can be decomposed into four terms that correspond to each of the countervailing effects.

Proposition 4*: If and only if hazard-reducing political strategy is not too costly, or the institutional environment is not too adverse, or the firm's market capabilities are not too low ($(2h-1)(4\alpha c^2 + h^2) < 2h^2$), then the positive relationship in Proposition 2 is stronger when the institutional environment is more hazard-prone.*

The next two propositions examine the comparative statics of the optimal market strategy investment x_1^*. Appendix 1 shows that $\frac{\partial x_1^*}{\partial c} < 0$, indicating that more capable firms invest more in the efficiency-enhancing market strategy. To see the intuition behind this result, I again examine how market capabilities affect the marginal return and the marginal cost of the market strategy. Appendix 1 shows that the marginal cost of the market strategy is invariant to any change in the firm's market capabilities, and the effect of market capabilities on the market strategy's marginal return $\frac{\partial^2 R_T^*}{\partial x \partial c}$ composes of two parts: (c1) a direct effect – holding the investment in the political strategy constant, additional investment in the market strategy increases firm profit and the increase is greater for more capable firms, so more capable firms have higher incentives to invest in the market strategy; and (c2) an indirect effect – a more capable firm invest more in the hazard-reducing political strategy (Proposition 2) which helps the firm to retain a greater proportion of its market return, and therefore capable firms have further incentives to invest in the market strategy.

Proposition 5*: Firms with greater market capabilities invest more in efficiency-enhancing market strategy than less capable firms.*

Finally, at the equilibrium, the sign of $\frac{\partial e_1^*}{\partial h}$ is not definite. Hypothetically, $\frac{\partial e_1^*}{\partial h} < 0$ indicates that firms invest less in the market strategy when the generic expropriation hazards are more severe. Appendix 1 shows that such a results holds under certain conditions: $\frac{\partial e_1^*}{\partial h} < 0$ if and only if $4\alpha c^2 + (1-h)^2 > 1$. Again, since the market strategy's marginal cost is invariant to any change in the institutional environment, I examine how the institutional environment affect the market strategy's marginal return ($\frac{\partial^2 R_T^*}{\partial x \partial h}$) to obtain more intuition. $\frac{\partial^2 R_T^*}{\partial x \partial h}$ composes of two parts which have opposite signs. The first component (d1) $-\frac{1-r_1^*}{c} x_1^* < 0$ is the result of taking a direct derivative with respect to h on the market strategy's marginal return, holding the investment in the market strategy constant; it is negative because the generic hazards h reduces the proportion of profit that the firm retains and thus directly reduces the marginal return to the market strategy. The second component (d2) $\frac{h x_1^*}{c} \frac{\partial r_1^*}{\partial h} > 0$ is the result of taking an indirect derivative with respect to h through r_1^* on the market strategy's marginal return; it is positive because a more adverse institutional environment encourages the investment in the political strategy, which further increases the marginal return to the market strategy. The total effect of (d1) and (d2) depends on the parameters.

Proposition 6*: If and only if the institutional environment is not too adverse, or the hazard-reducing political strategy is sufficiently costly, or the firm's market capabilities are sufficiently low (*$4\alpha c^2 + (1-h)^2 > 1$*), then firms invest less in efficiency-enhancing market strategy when the institutional environment is more hazard-prone.*

Finally, $\frac{\partial r_1^*}{\partial \alpha} < 0$ indicates that the investment in the hazard-reducing political strategy decreases when this strategy becomes more costly. In addition, $\frac{\partial e_1^*}{\partial \alpha} < 0$ indicates that the investment in the market strategy also decreases as the political strategy becomes more costly; intuitively, this is because the investment in the political strategy increases the marginal return of the market strategy and they are thus in a sense "complements". I present the proofs of all results of the basic model in Appendix 1.

3. GENERAL CONSIDERATIONS

In this section, I examine two variations of the basic model. Section 3.1 presents the basic model with the assumption that the generic expropriation hazards are not uniformly distributed for all firms and the hazards are more severe for more capable firms. Indeed, research shows that not all firms are equally exposed to expropriation hazards and market capabilities constitute an important factor (e.g., Cull and Xu, 2005). In Section 3.2, I reexamine the basic model by addition an assumption that the investments in the hazard-reducing political strategy and the efficiency-enhancing market strategy face a budget constraint. This assumption further makes the investment in the political strategy and that in the market strategy interdependent by entering them into each other's opportunity costs, the intention being to alleviate the concern that the positive relationship between firm market capabilities and the investment in hazard-reducing political strategy (Proposition 2) is solely driven by the complementarities of the market strategy and the political strategy (Proposition 1).

3.1 Heterogeneous Expropriation Hazards

I make an additional assumption that market capabilities not only reduce the production costs but also increase the firm's ex ante probability of having its profits infringed by the expropriation hazards. Specifically, I assume that firms with greater market capabilities have a higher ex ante likelihood to incur state predation than less capable ones. Firms with greater market capabilities may be more lucrative objects of state predation because of their higher earning potential, especially if they have committed large sunk investments, such as R&D investments (North and Weingast, 1989; Bardhan, 2005). At the same time, more capable firms are more likely to explore new business opportunities such as investment and innovation particularly in new market sectors, so they may face a greater number and variety of government bureaus, expanding their exposure to potential public expropriation; the lack of established practice or regulations in these new sectors, along with broad government discretion, further increases the risk of expropriation.

Under this additional assumption, I assume that the expropriation hazard is

(3.1) $H = 1 - h(1-r)(1-c)$, where $0 \leq h \leq 1$ and $0 \leq r \leq 1$

Note that (3.1) differs from the original assumption on realized expropriation hazards (2.3) in that it is higher for more capable firms ($\frac{\partial H(\cdot)}{\partial c} < 0$)[2]. The other assumptions, including the cost function, pricing, timing and profit maximization, remain identical to the basic model. The first-stage production decision (2.5) remains the same, and the second-stage profit maximization becomes:

(3.2) $\max_{\{r,x\}} \pi_{T2} = [1 - h(1-r)(1-c)]\, \pi_M^* - \frac{\alpha}{2} r^2 - \frac{1}{2} x^2$ where $\pi_M^* = \frac{x}{2c}$

I examine whether the propositions hold in this new model. Let $\{r_2^*, x_2^*\}$ denote the equilibrium solutions. $r_2^* = \frac{h(1-c)[1-h(1-c)]}{4\alpha c^2 - h^2(1-c)^2}$, $x_2^* = \frac{2\alpha c[1-h(1-c)]}{4\alpha c^2 - h^2(1-c)^2}$ (and $e_2^* = \sqrt{x_2^*}$); again assume $4\alpha c^2 - h^2(1-c)^2 > 0$ to ensure positive solutions. Note that $x_2^* = \frac{2\alpha c}{h(1-c)} r_2^*$, i.e., the ratio of the optimal investment in the market strategy and that in the political strategy is still positive, consistent with Proposition 1. Intuitively, compared with (2.3), the new assumption of heterogeneous expropriation hazards (3.1) directly increases the marginal return of the political strategy for more capable firms while directly lowers the marginal return of the market strategy for more capable firms. However, how this new assumption affects Proposition 2 and 3 is yet unclear, because the investment in the political strategy and that in the market strategy are also related through indirect effects. For instance, though heterogeneous hazards directly reduce the marginal returns of the market strategy, their positive effect on the marginal return of the

[2] It also implicitly assumes that the political strategy is more effective for firms with greater market capabilities ($\frac{\partial^2 H(\cdot)}{\partial r \partial c} < 0$). Admittedly, this heterogeneous expropriation hazard model makes it easier to find support for more capable firm's greater tendency to invest in the hazard-reducing political strategy.

political strategy may in turn encourage the investment in the market strategy. Appendix 2 shows that $\frac{\partial r_2^*}{\partial c} < 0$ and $\frac{\partial r_2^*}{\partial h} > 0$, consistent with Proposition 2 and 3. In addition, a sufficient condition for $\frac{\partial^2 r_2^*}{\partial h \partial c} < 0$ is $h(1-c) \leq \frac{1}{2}$, i.e., α is sufficient small or c is sufficiently small, consistent with Proposition 4. Results also show that $\frac{\partial e_2^*}{\partial c} < 0$, consistent with Proposition 5. Moreover, $\frac{\partial e_2^*}{\partial h} < 0$ if and only if $4\alpha c^2 + [1 - h(1-c)]^2 > 1$; compared with the sufficient and necessary condition for Proposition 6 (i.e., $4\alpha c^2 + (1-h)^2 > 1$), this is a less constraining condition. Finally, $\frac{\partial r_2^*}{\partial \alpha} < 0$ and $\frac{\partial e_2^*}{\partial \alpha} < 0$ are also consistent with the results of the basic model.

In sum, introducing heterogeneous expropriation hazards that vary with firm market capabilities does not alter the basic results, especially the effects of market capabilities on the investment in different strategies. The proofs of all results of this subsection are presented in Appendix 2.

3.2 Resource Budget

One may wonder whether the main result that firms with greater market capabilities invest more in the hazard-reducing political strategy (Proposition 2) is solely driven by the complementary relationship between the investment in the market strategy and that in the hazard-reducing political strategy (Proposition 1). The model variation in this section offers a robustness check for this concern. Based on the previous model with heterogeneous expropriation hazards, I develop a new model by additionally assuming that the total resources invested in the political strategy and the market strategy is subject to a budget constraint[3]. For instance, if a key resource in pursuing both strategies is managerial time and attention, then the two types of investments face a budge constraint because of the limited supply of managerial time and attention. Under this assumption, the opportunity cost of the political strategy and that of the market strategy become directly interdependent since the investment in the political strategy and that in the market strategy compete with each other for an exogenously fixed

[3] I resume the heterogeneous expropriation hazards assumption, because with homogeneous expropriation hazards the optimal investment in the political strategy is unrelated to market capabilities as shown in Appendix 3.

constraint – in an interior solution, an increase in the optimal investment in one strategy has to be accompanied by an decrease in the other.

Assume that the first-stage production problem (2.5) remains the same. Under the fixed budget assumption, the second-stage maximization problem becomes:

(3.3) $\max_{\{r,x\}} \pi_{T3} = [1 - h(1-r)(1-c)]\,\pi_M^*$

(3.4) s.t. $\frac{\alpha}{2}r^2 + \frac{1}{2}x^2 \leq R_3, R_3 > 0$

For simplicity, instead of breaking down the cost into a constrained part and an unconstraint part, in (3.4) I assume that the cost of the hazard-reducing political strategy $C_r(r)$ and the cost of the efficiency-enhancing market strategy $C_e(x)$ add up to a fixed amount in monetary terms R_3.

Let $\{r_3^*, x_3^*\}$ denote the optimal solutions. Appendix 3 shows $r_3^* = -\frac{1}{4}\left[\frac{1}{h(1-c)} - 1\right] + \frac{1}{2}\sqrt{D_3}$ where $D_3 = \frac{1}{4}\left[\frac{1}{h(1-c)} - 1\right]^2 + \frac{4R_3}{\alpha}$, and $x_3^* = \sqrt{2R_3 - \alpha r_3^{*2}}$ (and $e_3^* = \sqrt{x_3^*}$). As expected, Proposition 1 does not hold since r_3^* and x_3^* are negatively related, an immediate consequence of introducing the budget constraint. In addition, $\frac{\partial r_3^*}{\partial c} < 0$ and $\frac{\partial r_3^*}{\partial h} > 0$, consistent with Proposition 2 and 3, respectively. To examine Proposition 4, The sign of $\frac{\partial^2 r_3^*}{\partial c \partial h}$ is indefinite; a sufficient condition for $\frac{\partial^2 r_3^*}{\partial c \partial h} < 0$ is $2\sqrt{D_3} < \frac{1}{h(1-c)} - 1$, that is, if the budget is relatively small, or if the political strategy is relatively costly. Intuitively, the converse of these two conditions (i.e., R_3 is large and/or α is small) means that the magnitude of the (negative) marginal effect of the generic hazards on the optimal investment in the efficiency-enhancing market strategy is large; this means that a more adverse institutional environment discourages the investment in the market strategy and thus lowers the value at risk of expropriation, which weakens the incentive of investing in the hazard-reducing political strategy for all firms including the more capable ones.

Appendix 3 also shows that $\frac{\partial e_3^*}{\partial c} > 0$, inconsistent with the result in Proposition 5 which states $\frac{\partial e_1^*}{\partial c} < 0$. Intuitively, the Proposition 5 cannot hold in the current model with a resource budget because the investment in the political strategy competes with that in the market strategy (the reason why Proposition 1 does not hold) so that the sign of $\frac{\partial e_3^*}{\partial c}$ and that of $\frac{\partial r_3^*}{\partial c}$ cannot be the same. More specifically, although higher market capabilities should increase the marginal return of the market strategy through both a direct effect (increases the profit) and an indirect effect (increases the investment in the political strategy that in turn safeguards the profit from expropriation hazards), the current model additionally introduces a negative effect – market capabilities increases the opportunity cost of the market strategy by making the political strategy more rewarding; the final outcome is that the last negative effect dominates the former two positive effects.

Furthermore, $\frac{\partial e_3^*}{\partial h} < 0$, consistent with Proposition 6. Finally, $\frac{\partial r_3^*}{\partial \alpha} < 0$ is also consistent with the findings in the basic model; however, $\frac{\partial e_3^*}{\partial \alpha} > 0$, inconsistent with the previous result $\frac{\partial e_1^*}{\partial \alpha} < 0$, because a decrease in the investment of the political strategy lowers the opportunity cost of market strategy investment, which weakens their complementary relationship.

In sum, introducing a budget constraint in the model removes the complementary relationship between the political strategy and the market strategy (therefore Proposition 1 and 5 fail), but main results stating how the firm's market capabilities affect its investment in political strategy still hold (Proposition 2 and 3). All proofs in this subsection are presented in Appendix 3.

4. MODEL EXTENSIONS

4.1 Rent-Seeking Political Strategy: Unrelated to Production

To motivate the analysis, in the introduction section I distinguish hazard-reducing political strategy from rent-seeking political strategy and suggest that the answer to the research question of which firms are more active politically depends on the type of political strategy being pursued. The previous models all focus on hazard-reducing political strategy, and in this section I model rent-seeking political strategy, a different type of political strategy. Rather than considering the political strategy that safeguards the firm's profit against expropriation hazards, I intend to model some common types of rent-seeking political strategy which confer to the firm extra rents. I explore the effect of the firm's market capabilities on its investment in rent-seeking political strategy. There are a great variety of rent-seeking political strategies and they benefit firms in various ways; for instance, a common form is to confer to a firm certain additional benefits that are not related to the firm's production, such as a lump-sum government subsidy.

Assume that as in the second stage the firm faces the same production decision as in basic model and chooses the production quantity to maximize equation (2.5). The optimal second-stage production quantity remains the same $q^* = \frac{e}{c}$ and the optimal profit is still $\pi_M^* = \frac{e^2}{2c}$. Again, let $x = e^2$.

In the first stage, the firm decides on how much to invest in not only the market strategy e but also a rent-seeking political strategy that is unrelated to the market production. Assume that the rent-seeking political strategy, denoted as z, generates the following revenue

(4.1) $g(z) = az$ and $a > 0$

Assume that the cost of the rent-seeking political strategy is $C_z(z) = \frac{\beta}{2}z^2$ and $\beta > 0$ to ensure interior solutions. If we assume that there is no resource budget constraint on the investment in the efficiency-enhancing market strategy and that in the rent-seeking political strategy, the two investment decisions would be independent, i.e., the optimal investment level of each is only determined by its own marginal benefit and marginal cost, and in particular, the marginal benefit and marginal cost of the rent-seeking political strategy are unrelated to the firm's market capabilities and its investment in the market strategy (see Appendix 4). Since we are interested in the question of how market capabilities affect political strategy, I resume the assumption of a resource budget constraint, and therefore the return to the firm's market strategy investment is part of the opportunity cost of the rent-seeking political strategy. Thus the first-stage optimization problem becomes:

(4.2) $\max_{\{z,x\}} \pi_{T4} = \pi_M^* + g(z) = \frac{x}{2c} + az$

(4.3) s.t. $\frac{\beta}{2}z^2 + \frac{1}{2}x^2 \leq R_4, R_4 > 0$

(4.3) is the budget constraint. Let $\{z_4^*, x_4^*\}$ denote the optimal solutions; Appendix 4 shows that $z_4^* = 2ca\sqrt{\frac{2R_4}{\beta^2+4\beta c^2a^2}}$ and $x_4^* = \beta\sqrt{\frac{2R_4}{\beta^2+4\beta c^2a^2}}$ (and $e_4^* = \sqrt{x_4^*}$). The budget constraint implies that the investment in the rent-seeking political strategy and that in the efficiency-enhancing market strategy are substitutes.

In addition, $\frac{\partial z_4^*}{\partial c} > 0$ indicates that firms with lower market capabilities invest more in the non-production-related rent-seeking political strategy, which forms a contrast to Proposition 2. This is because in the current model market capabilities do not affect the marginal return of the rent-seeking political strategy except through their effect on the market strategy; since the market strategy competes with the rent-seeking political strategy for resources and more capable firms invest more in the market strategy (the proof is presented later in the section), market capabilities only have a negative effect on the firm's incentive to invest in the rent-seeking political strategy.

Proposition 7*: Firms with lower market capabilities invest more in non-production-related rent-seeking political strategy.*

Together with Proposition 2, this result suggest that the answer to the question of which firms are more active in taking political strategy depends on how the political strategy confers benefits to the firms: firms with greater market capabilities invest more in hazard-reducing political strategy while less capable firms invest more in non-production-related rent-seeking political strategy. To further explore this implication, I examine both types of political strategies simultaneously in the next section.

Moreover, $\frac{\partial e_4^*}{\partial c} < 0$ indicates that more capable firms tend to invest more in the market strategy, consistent with Proposition 5. In addition, $\frac{\partial z_4^*}{\partial a} > 0$ and $\frac{\partial e_4^*}{\partial a} < 0$, indicating that a more lucrative or rewarding rent-seeking political strategy encourages investment in it while discouraging the investment in the market strategy. Finally, as rent-seeking becomes more expensive, firms tend to invest less in the political strategy $\frac{\partial z_4^*}{\partial \beta} < 0$ and more in the market strategy $\frac{\partial e_4^*}{\partial \beta} > 0$, and the latter is consistent with the results in the model with the resource budget constraint assumption. The proofs of all results of this subsection are reported in Appendix 4.

4.2 Full Model: Rent-Seeking Political Strategy and Hazard-Reducing Political Strategy

One may also wonder how the firm chooses between rent-seeking political strategy and hazard-reducing political strategy, in addition to the choice between rent-seeking political strategy and efficiency-enhancing market strategy. In this section, I examine the investment in the non-production-related rent-seeking political strategy and that in the hazard-reducing political strategy.

Assume that the second-stage production remains the same as (2.6). Assume that in the first stage, the firm faces expropriation hazards (3.1) and an opportunity to seek rent (4.1). Again, to link the decision of the rent-seeking political strategy to the firm's market capabilities, assume that the total investments are subject to a budget constraint. Therefore, the first-stage model is

(4.4) $\max_{\{z,r\}}\ \pi_{T4} = [1 - h(1-r)(1-c)]\pi_M^* + g(z) = [1 - h(1-r)(1-c)]\frac{x}{2c} + az$

(4.5) s.t. $\frac{\beta}{2}z^2 + \frac{1}{2}r^2 \leq R_5$

Let $\{z_5^*, r_5^*\}$ denote the optimal solutions; Appendix 4 shows that $r_5^{*2} = \frac{2R_5}{1+\frac{a^2}{\beta h^2(1-c)^2\pi_M^{*2}}}$ and $z_5^* = \frac{\sqrt{2R_5}}{\sqrt{\beta+(\frac{\beta}{a})^2 h^2(1-c)^2\pi_M^{*2}}}$. Interestingly, $\frac{\partial r_5^*}{\partial c} < 0$ and $\frac{\partial z_5^*}{\partial c} > 0$, indicating that facing the choice of investing in both types of political strategies, firms with greater market capabilities invest more in the hazard-reducing political strategy whereas those of a less capability invest more in the rent-seeking political strategy.

Proposition 8*: When both the choice of non-production-related rent-seeking political strategy and that of hazard-reducing political strategy are present, firms with greater market capabilities invest more in the hazard-reducing political strategy while firms with lower market capabilities invest more in the non-production-related rent-seeking political strategy.*

In addition, $\frac{\partial r_5^*}{\partial a} < 0$ and $\frac{\partial z_5^*}{\partial a} > 0$ indicate that as the rent-seeking political strategy becomes more lucrative or rewarding, the firm tends to invest more in the rent-seeking political strategy and less in the hazard-reducing political strategy. $\frac{\partial r_5^*}{\partial \beta} > 0$ and $\frac{\partial z_5^*}{\partial \beta} < 0$ indicate that as rent-seeking become more costly relative to reducing the hazards of expropriation, firms invest more in the latter and less in the former. The proofs of all results of this subsection are presented in Appendix 5.

A final note is that rent-seeking political strategy may also generate benefits that are related to the firm's second-stage production, such as a price subsidy. Intuitively, since firms with greater market capabilities have a comparative advantage in market production, they should have greater incentives to engage in any strategy that faciliates its market production. For instance, in the basic model, the hazard-reducing political strategy safeguards the market production, so more capable firms have greater incentives to invest in it. If I assume a price-subsidy type of rent-seeking political strategy that contributes to firm's market production through affecting the sales price in a model with no budget constraint, then results show that the investment in the production-related rent-seeking political strategy is positively related to that in the market strategy and that firms with greater market capabilities invest more in this political strategy (results not reported). This contrast with Proposition 7 where more capable firms invest less in non-production-related rent-seeking political strategy; the difference originates from how the different political strategies confer rents – if the rents directly contribute to the market production which is a more capable firm's comparative advantage, more capable firms have higher incentives to pursue them; otherwise less capable firms are more active in engaging in non-production-related rent-seeking political strategy. The findings suggest that the answer to the research question hinges on how a political strategy confers specific rents to firms.

5. CONCLUSION AND DISCUSSION

This paper shed light on the tradeoffs firms face when investing in different kinds of political strategies. In particular, it demonstrates that stronger firms invest more in hazard-reducing political strategy, while weaker firms invest more in certain types of rent-seeking political strategy. In addition, hazard-reducing political strategy and market strategy may be complements in some circumstances. These help to understand some seemingly contradicting observations.

On the one hand, political strategies are recognized to generate supra-normal profits by creating or sustaining market failures, which interfere with effective market competition (Oberholzer-Gee and Yao, 2008) and divert resources away from value-creating market strategies (Morck et al. 2001; Johnson and Mitton, 2003; Leuz and Oberholzer-Gee, 2006). It follows that weaker firms tend to have comparative advantage in pursuing these political strategies relative to competing in markets, and are thus more likely to invest in political strategy than stronger competitors.

On the other hand, however, political strategy is also used, particularly in environments with poor-quality market-supporting institutions such as many emerging economies, to protect a firm's properties from expropriation hazards. This is fundamentally different from rent-seeking purposes. For instance, firms may seek to strengthen legal protection of property rights contracts through political participation; in China, for example, the first proposal to substantially revise the constitution to explicitly specify protection of private property was initiated only in 1998 by Zhuohui Zheng, a privately-owned firm owner in the city of Shenzhen and a deputy of the National People's Congress.[4] In an empirical paper, Jia (2009) show that, in the Chinese private sector, firms of higher R&D intensity, higher marketing intensity, or higher production efficiency are more likely to pursue political strategy, assuming that political strategy alleviates wide-spread expropriation hazards in the institutional environment.

This paper introduces a framework that helps to better understand these issues, by showing that different types of political strategies differ fundamentally in how they confer benefits to the firms, how they affect firms' incentives to adopt, and their relationships with productive market strategies. Moreover, this paper also contributes to the emerging literature of nonmarket strategy and how nonmarket strategy

[4] See *Zhejiang Online*, December 29, 2007.

should be integrated with market strategy (Baron, 1995a, 1997). This paper analyzes the interdependence of firms' political strategy and market positions; for instance, an external shock may change the marginal returns of hazard-reducing political strategy not only through a direct effect on how effective the political strategy safeguards the firm's profit, but also through an indirect effect via the response of the market strategy which influences the value of the political strategy. This paper further explores the circumstances under which political strategy and market strategy may be complements or substitutes.

Although main benefits of hazard-reducing political strategy rest on the premise that the business environment lacks adequate market-supporting institutions, which is more prevalent in emerging economies, the essence of this type of political strategy may also be relevant to more developed economies. Particularly in fast-growing new sectors of a more developed economy, the institutional development may lag behind booming economic activities, which provides similar incentives for leading firms to seek institutional protection. In the U.S., for example, the hugely successful company Google has recently engaged lobbyists to pursue action in the American Congress on issues such as network neutrality and online copyright protection (Birnbaum, 2007; Delaney and Schatz, 2007). This may extend the connotation of "hazard-reducing" political strategy beyond reducing the expropriation hazards in emerging economies.

REFERENCES

Bardhan, Pranab, 1997. Corruption and Development: A Review of Issues. Journal of Economic Literature, 35(3), 1320-1346.

Baron, David P., 1995. The Nonmarket Strategy System. Sloan Management Review, 37(1), 73-85.

Baron, David P., 1995. Integrated Strategy: Market and Nonmarket Components. California Management Review, 37, 47-65.

Baron, David P., 1997. Integrated Strategy and International Trade Disputes: The Kodak-Fujifilm Case. Journal of Economics & Management Strategy, 6(2), 291-346.

Birnbaum, Jeffrey H., 2007, Learning From Microsoft's Error, Google Builds a Lobbying Engine, The Washington Post, Washington, D.C.

Cashore, Benjamin, 1997. Flights of the Phoenix: Explaining the Durability of the Canada-U.S. Softwood Lumber Dispute. Canadian-American Public Policy, 32(Dec), 1-58.

Cull, Robert and Xu, Lixin Colin, 2005. Institutions, ownership, and finance: the determinants of profit reinvestment among Chinese firms Journal of Financial Economics 77(1), 117-146.

Delaney, Kevin J. and Schatz, Amy, 2007, Power Broker: Goggle Goes to Washington With Own Brand of Lobbying; Internet Giant Offers Its Services to Congress As D.C. Scrutiny Grows, The Wall Street Journal, New York.

Faccio, Mara, Masulis, Ronald W. and McConnell, John J., 2006. Political Connections and Corporate Bailouts The Journal of Finance, 61(6), 2597-2635.
Fisman, Raymond, 2001. Estimating the Value of Political Connections. The American Economic Review, 91(4), 1095-1102.
Hellman, Joel S., Jones, Geraint and Kaufmann, Daniel, 2003. Seize the State, Seize the Day: State Capture and Influence in Transition Economies. Journal of Comparative Economics(31), 751-773.
Hillman, Amy J. and Hitt, Michael A., 1999. Corporate Political Strategy Formulation: A Model of Approach, Participation, and Strategy Decisions. Academy of Management Review, 24(4), 825-842.
Jia, Nan, 2009. Firms' Political Strategy and Market Capabilities in Emerging Economies: Evidence from the Chinese Private Sector. Working paper.
Johnson, Simon and Mitton, Todd, 2003. Cronyism and Capital Controls: Evidence from Malaysia. Journal of Financial Economics, 67, 351-382.
Lenway, Stefaine, Morck, Randall and Yeung, Bernard, 1996. Rent Seeking, Protectionism and Innovation in the American Steel Industry. The Economic Journal, 106(435), 410-421.
Leuz, Christian and Oberholzer-Gee, Felix, 2006. Political relationships, global financing, and corporate transparency: Evidence from Indonesia Journal of Financial Economics 81(2), 411-439
Li, Hongbin, Meng, Lingsheng and Zhang, Junsen, 2006. Why Do Entrepreneurs Enter Politics? Evidence from China. Economic Inquiry, 44(3), 559-578.
Morck, Randall, Sepanski, Jungsywan and Yeung, Bernard, 2001. Habitual and Occasional Lobbyers in the U.S. Steel Industry: An EM Algorithm Pooling Approach. Economic Inquiry, 39(3), 365-378.
North, Douglass C. and Weingast, Barry R., 1989. Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England. The Journal of Economic History, 49(4), 803-832.
Oberholzer-Gee, Felix and Yao, Dennis, 2008, Integrated Strategy, Working Paper.
Schuler, Douglas A., 1996. Corporate Political Strategy and Foreign Competition: The Case of the Steel Industry. Academy of Management Journal, 39(3), 720-737.

APPENDIX 1

In the second stage,

$$(3.1)\ \ \max_{\{q\}}\ \pi_M = q - \left[\frac{1}{2}cq^2 + (1-e)q\right]$$

The first-order condition is $1 = cq^* + (1-e)$ and thus the optimal production quantity is $q^* = \frac{e}{c} > 0$. At the equilibrium, $\pi_M^* = \frac{e^2}{2c}$. Given the optimal production, the first-stage optimization problem is (let $x = e^2$):

$$(3.2)\ \ \max_{\{r,x\}}\ \pi_{T1} = [1 - h(1-r)]\frac{x}{2c} - \frac{\alpha}{2}r^2 - \frac{1}{2}x^2$$

The first order conditions are $\frac{\partial\, \pi_{T1}}{\partial r} = \frac{hx}{2c} - \alpha r = 0$ and $\frac{\partial\, \pi_{T1}}{\partial x} = \frac{1-h(1-r)}{2c} - x = 0$, which yield the equilibrium $r_1^* = \frac{h(1-h)}{4\alpha c^2 - h^2}$ and $x_1^* = \frac{2\alpha c(1-h)}{4\alpha c^2 - h^2}$, assuming that $4\alpha c^2 - h^2 > 0$.

At the equilibrium, $\frac{\partial r_1^*}{\partial h} = \left(\frac{1}{4\alpha c^2 - h^2}\right)^2 [4\alpha c^2(1-2h) + h^2] > \left(\frac{1}{4\alpha c^2 - h^2}\right)^2 [h^2(1-2h) + h^2] = \left(\frac{1}{4\alpha c^2 - h^2}\right)^2 2h^2(1-h) > 0$; the first inequation holds because $4\alpha c^2 > h^2$. $\frac{\partial r_1^*}{\partial c} = (-1)\frac{h(1-h)8\alpha c}{(4\alpha c^2 - h^2)^2} < 0$. $\frac{\partial^2 r_1^*}{\partial h \partial c} = \frac{8\alpha c(4\alpha c^2 - h^2)}{(4\alpha c^2 - h^2)^4}[(2h-1)(4\alpha c^2 + h^2) - 2h^2]$ so $\frac{\partial^2 r_1^*}{\partial h \partial c} < 0$ if and only if $(2h-1)(4\alpha c^2 + h^2) < 2h^2$. Note that $\frac{\partial^2 r_1^*}{\partial h \partial c} = \frac{8\alpha c(4\alpha c^2 - h^2)}{(4\alpha c^2 - h^2)^4}[2h(4\alpha c^2 + h^2) - 3h^2 - 4\alpha c^2] < \frac{8\alpha c(4\alpha c^2 - h^2)}{(4\alpha c^2 - h^2)^4}[16h\alpha c^2 - 3h^2 - 4\alpha c^2] < \frac{8\alpha c(4\alpha c^2 - h^2)}{(4\alpha c^2 - h^2)^4}[16h\alpha c^2 - 4h^2] = \frac{32h\alpha c(4\alpha c^2 - h^2)}{(4\alpha c^2 - h^2)^4}[4\alpha c^2 - h]$ where both the first and the second inequalities follows from $4\alpha c^2 - h^2 > 0$, so the upper bound for $\frac{\partial^2 r_1^*}{\partial h \partial c}$ is positive.

Furthermore, since $e_1^* = \sqrt{x_1^*}$, $sign\left(\frac{\partial e_1^*}{\partial h}\right) = sign\left(\frac{\partial x_1^*}{\partial h}\right)$ and $sign\left(\frac{\partial e_1^*}{\partial c}\right) = sign\left(\frac{\partial x_1^*}{\partial c}\right)$. $\frac{\partial x_1^*}{\partial c} = \frac{2\alpha(1-h)}{(4\alpha c^2 - h^2)^2}(-h^2 - 4\alpha c^2) < 0$, so $\frac{\partial e_1^*}{\partial c} < 0$.

$\frac{\partial x_1^*}{\partial h} = \left(\frac{1}{4\alpha c^2 - h^2}\right)^2 (-4\alpha c^2 - h^2 + 2h) = \left(\frac{1}{4\alpha c^2 - h^2}\right)^2 (-1)[4\alpha c^2 + (1-h)^2 - 1]$ so $\frac{\partial x_1^*}{\partial h} < 0$ (and thus $\frac{\partial e_1^*}{\partial h} < 0$) if and only if $4\alpha c^2 + (1-h)^2 > 1$. Note that $\frac{\partial x_1^*}{\partial h} = \frac{2\alpha c}{(4\alpha c^2 - h^2)^2}(-4\alpha c^2 - h^2 + 2h) < \frac{2\alpha c}{(4\alpha c^2 - h^2)^2}(-2h^2 + 2h) = \frac{2\alpha c}{(4\alpha c^2 - h^2)^2}(2h)(1-h)$ where the first inequality also follows from $4\alpha c^2 - h^2 > 0$, and this gives a positive upper bound for $\frac{\partial x_1^*}{\partial h}$.

The optimal profit that the firm retains is $R_T^* = [1 - h(1 - r_1^*)]\frac{x_1^*}{2c}$ where $x_1^* = [p - (1 - e_1^*)]^2$. Therefore, the marginal return of the political strategy is $\frac{\partial R_T^*}{\partial r_1^*} = h\frac{x_1^*}{2c}$, and the marginal cost of the political strategy is $\frac{\partial C_r^*}{\partial r_1^*} = \alpha r_1^*$ which is invariant to any change in the generic hazards h or the market capabilities c. (1) $\frac{\partial^2 R_T^*}{\partial r \partial c} = -\frac{h x_1^*}{2c^2} + \frac{h}{c}\frac{\partial x_1^*}{\partial c} < 0$ since $\frac{\partial x_1^*}{\partial c} < 0$. (2) $\frac{\partial^2 R_T^*}{\partial r \partial h} = \frac{x_1^*}{c}\frac{\alpha c}{(4\alpha c^2 - h^2)^2}[(1-h)(4\alpha c^2 - h^2) + 2h(-4\alpha c^2 - h^2 + 2h)] \geq 4\alpha c^2 + 3h^2 + h^3 - 20h\alpha c^2 \geq 4\alpha c^2 + h^2 > 0$; the first inequality holds because $-h^2 > -4\alpha c^2$ and the second inequality holds because $h^2 \geq h^3$. (3) $\frac{\partial^3 R_T^*}{\partial r \partial h \partial c} = -\frac{x_1^*}{2c^2} + \frac{1}{2c}\frac{\partial x_1^*}{\partial c} - \frac{h}{2c^2}\frac{\partial x_1^*}{\partial h} + \frac{h}{2c}\frac{\partial^2 x_1^*}{\partial c \partial h}$; the first component is $-\frac{x_1^*}{2c^2} > 0$, the second is $\frac{1}{2c}\frac{\partial x_1^*}{\partial c} < 0$ (because $\frac{\partial x_1^*}{\partial c} < 0$), the third is $-\frac{h}{2c^2}\frac{\partial x_1^*}{\partial h}$ whose sign is negative if and only if $4\alpha c^2 + (1-h)^2 < 1$ (because $\frac{\partial x_1^*}{\partial h} < 0$ if and only if $4\alpha c^2 + (1-h)^2 > 1$), and the fourth component is $\frac{h}{2c}\frac{\partial^2 x_1^*}{\partial c \partial h}$ whose sign is the same as $\frac{\partial^2 x_1^*}{\partial c \partial h}$. $\frac{\partial^2 x_1^*}{\partial c \partial h} = \frac{2\alpha}{(4\alpha c^2 - h^2)^3}[(4\alpha c^2 - h^2)(4\alpha c^2 - h^2 - 6h) - 8h^3]$, which tends to be negative if αc^2 is sufficiently small.

At the equilibrium, the marginal return of the market strategy is $\frac{\partial R_T^*}{\partial x_1^*} = [1 - h(1-r)]\frac{x_1^*}{2c}$, and the marginal cost of the market strategy is $\frac{\partial C_e^*}{\partial x_1^*} = x_1^*$ which is invariant to any change in the generic hazards h or the market capabilities c. (1) $\frac{\partial^2 R_T^*}{\partial x_1^* \partial c} = -\frac{1-h(1-r_1^*)}{2c^2}x_1^* + \frac{hr_1^* x_1^*}{c}\frac{\partial r_1^*}{\partial c} < 0$ since $\frac{\partial r_1^*}{\partial c} < 0$. (2) $\frac{\partial^2 R_T^*}{\partial x_1^* \partial h} = -\frac{(1-r_1^*)x_1^*}{c} + \frac{hx_1^*}{c}\frac{\partial r_1^*}{\partial h}$ where the first term is negative yet the second term is positive.

Finally, $\frac{\partial r_1^*}{\partial \alpha} = \frac{-4c^2h(1-h)}{(4\alpha c^2 - h^2)^2} < 0$, $\frac{\partial x_1^*}{\partial \alpha} = -\frac{2c(1-h)h^2}{(4\alpha c^2 - h^2)^2} < 0$ and $sign\left(\frac{\partial e_1^*}{\partial \alpha}\right) = sign\left(\frac{\partial x_1^*}{\partial \alpha}\right)$.

APPENDIX 2

The results of the second-stage optimization problem is the same as the first stage in Appendix 1, and the second-stage optimization is

$$(3.2)\ \ \max_{\{r,x\}}\ \pi_{T2} = [1 - h(1-r)(1-c)]\frac{x}{2c} - \frac{\alpha}{2}r^2 - \frac{1}{2}x^2$$

Let $y = h(1-c)$, then the solutions for (3.3) are the same as those for (3.2) except that h is replaced by y, therefore $r_2^* = \frac{y(1-y)}{4\alpha c^2 - y^2} = \frac{h(1-c)[1-h(1-c)]}{4\alpha c^2 - h^2(1-c)^2}$, $x_2^* = \frac{2\alpha c(1-y)}{4\alpha c^2 - y^2} = \frac{2\alpha c[1-h(1-c)]}{4\alpha c^2 - h^2(1-c)^2}$ $e_2^* = \sqrt{x_2^*}$; assume that $4\alpha c^2 - h^2(1-c)^2 > 0$ At the equilibrium, $\frac{\partial r_2^*(y)}{\partial h} = \frac{\partial r_2^*(y)}{\partial y}\frac{\partial y}{\partial h} + \frac{dr_2^*(y)}{dh} = \frac{\partial r_2^*(y)}{\partial y}\frac{\partial y}{\partial h} > 0$; the last inequality holds because $\frac{\partial r_1^*}{\partial h} > 0$ and $r_2^*(y)$ has an identical structure as $r_1^*(h)$. In addition, $\frac{\partial r_2^*(y)}{\partial c} = \frac{\partial r_2^*(y)}{\partial y}\frac{\partial y}{\partial c} + \frac{dr_2^*(y)}{dc} < 0$, and the last inequality holds because $\frac{\partial r_2^*(y)}{\partial y} > 0$ that follows from $\frac{\partial r_1^*(h)}{\partial h} > 0$, $\frac{\partial y}{\partial c} < 0$ and $\frac{dr_2^*(y)}{dc} = \frac{-8\alpha cy(1-y)}{(4\alpha c^2 - y^2)^2} < 0$. $\frac{\partial^2 r_2^*}{\partial h \partial c} = \frac{\partial^2 r_2^*}{\partial y \partial c}\frac{\partial y}{\partial h} + \frac{\partial r_2^*}{\partial y}\frac{\partial^2 y}{\partial h \partial c} + \frac{dr_2^*}{dc}$. Note that $\frac{\partial r_2^*}{\partial y}\frac{\partial^2 y}{\partial h \partial c} = -\frac{\partial r_2^*}{\partial y} < 0$ and $\frac{dr_2^*}{dc} < 0$. The first term is $\frac{\partial^2 r_2^*}{\partial y \partial c}\frac{\partial y}{\partial h} = \frac{(1-c)}{(4\alpha c^2 - y^2)^2}[-4\alpha c^2(1-2y) - (1-2y)y^2 - 2y^2]$. If $1 - 2y > 0$, then $\frac{\partial^2 r_2^*}{\partial y \partial c}\frac{\partial y}{\partial h} < 0$ and thus $\frac{\partial^2 r_2^*}{\partial h \partial c} < 0$. If α or c is sufficiently small so that $\frac{\partial^2 r_2^*}{\partial y \partial c}\frac{\partial y}{\partial h} < 0$, then $\frac{\partial^2 r_2^*}{\partial h \partial c} < 0$.

Furthermore, since $e_2^* = \sqrt{x_2^*}$, $sign\left(\frac{\partial e_2^*}{\partial h}\right) = sign\left(\frac{\partial x_2^*}{\partial h}\right)$ and $sign\left(\frac{\partial e_2^*}{\partial c}\right) = sign\left(\frac{\partial x_2^*}{\partial c}\right)$. $\frac{\partial x_2^*}{\partial h} = \frac{\partial x_2^*}{\partial y}\frac{\partial y}{\partial h} + \frac{dx_2^*}{dh}$; $\frac{dx_2^*}{dh} = 0$, $\frac{\partial y}{\partial h} = (1-c) > 0$, and $\frac{\partial x_2^*}{\partial y} = -4\alpha c^2 - (1-y)^2 + 1$. Therefore, $\frac{\partial x_2^*}{\partial h} < 0$ if and only if $4\alpha c^2 + (1-y)^2 > 1$. Finally, $\frac{\partial x_2^*}{\partial c} = \frac{A}{[4\alpha c^2 - h^2(1-c)^2]^2}$ where $A = -4\alpha c^2(1-h) - h^2(1-c)^2(1-h+ch) - 2h^2c(1-c)(1-h+ch) < 0$, thus $\frac{\partial x_2^*}{\partial c} < 0$.

Finally, $\frac{\partial r_2^*}{\partial \alpha} = \frac{-4c^2h(1-c)[1-h(1-c)]}{[4\alpha c^2 - h^2(1-c)^2]^2} < 0$, $\frac{\partial x_2^*}{\partial \alpha} = -\frac{2c[1-h(1-c)]h^2(1-c)^2}{[4\alpha c^2 - h^2(1-c)^2]^2} < 0$ and $sign\left(\frac{\partial e_2^*}{\partial \alpha}\right) = sign\left(\frac{\partial x_2^*}{\partial \alpha}\right)$.

APPENDIX 3

The results of the second-stage optimization problem are the same as the first stage in Appendix 1. If the second-stage optimization assumes homogeneous expropriation hazards, i.e., $\max_{\{r,x\}}\ \pi_{T3} = [1-h(1-r)]\,\pi_M^*\ s.t.\ \frac{\alpha}{2}r^2+\frac{1}{2}x^2 \le R_3$, then let the Lagrange equation be $L=[1-h(1-r)]\frac{x}{2c}+\delta\left(R_3-\frac{\alpha}{2}r^2-\frac{1}{2}x^2\right)$, and the first order equations are $\frac{hx}{2c}-\delta\alpha r=0$, $\frac{1-h+hr}{2c}-\delta x=0$ and $\frac{\alpha}{2}r^2+\frac{1}{2}x^2=R_3$. The solution is $r_{temp}=-\frac{1-h}{4h}+\frac{\sqrt{D}}{2\alpha}$ where $D=\left(\frac{1-h}{2h}\right)^2+\frac{4R_3}{\alpha}$, and $\frac{\partial r_{temp}}{\partial c}=0$.

Therefore I assume heterogeneous expropriation hazards in the model with a budget constraint:

(3.3) $\max_{\{r,x\}}\ \pi_{T3}=[1-h(1-r)(1-c)]\,\pi_M^*$ (3.4) s.t. $\frac{\alpha}{2}r^2+\frac{1}{2}x^2\le R_3$

Let the Lagrange equation be $L=[1-h(1-r)(1-c)]\frac{x}{2c}+\delta\left(R_3-\frac{\alpha}{2}r^2-\frac{1}{2}x^2\right)$ and let $\{r_3^*,x_3^*\}$ denote the optimal solutions.The first order conditions are $\frac{h(1-c)x_3^*}{2c}-\delta\alpha r_3^*=0$, $\frac{1-h(1-c)(1-r_3^*)}{2c}-\delta x_3^*=0$ and $\frac{\alpha}{2}r_3^{*2}+\frac{1}{2}x_3^{*2}=R_3$. The solutions are $r_3^*=-\frac{1}{4}\left[\frac{1}{h(1-c)}-1\right]+\frac{1}{2}\sqrt{D_3}$ where $D_3=\frac{1}{4}\left[\frac{1}{h(1-c)}-1\right]^2+\frac{4R_3}{\alpha}$; $x_4^*=\sqrt{(2R_3-\alpha r_3^{*2})}$ and $e_3^*=\sqrt{x_3^*}-p+1$.

$\frac{\partial r_3^*}{\partial c}=-\frac{1}{4}\frac{1}{h(1-c)^2}+\frac{1}{4\sqrt{D_3}}\frac{dD_3}{dc}=\frac{1}{4h(1-c)^2}\left[-1+\frac{1}{2\sqrt{D_3}}\frac{1-h(1-c)}{h(1-c)}\right]<0$; the last inequation holds because $D_3>\frac{1}{4}\left[\frac{1}{h(1-c)}-1\right]^2$, thus $\frac{1}{2\sqrt{D_3}}<\frac{1-h(1-c)}{h(1-c)}$ and $-1+\frac{1}{2\sqrt{D_3}}\frac{1-h(1-c)}{h(1-c)}<1$. $\frac{\partial r_3^*}{\partial h}=\frac{1}{4h^2(1-c)}+\frac{1}{4\sqrt{D_3}}\frac{dD_3}{dc}=\frac{1}{4h^2(1-c)}\left[1-\frac{1}{2\sqrt{D_3}}\frac{1-h(1-c)}{h(1-c)}\right]>0$; the last inequation holds because $\frac{1}{2\sqrt{D_3}}<\frac{1-h(1-c)}{h(1-c)}$ and thus $1-\frac{1}{2\sqrt{D_3}}\frac{1-h(1-c)}{h(1-c)}>0$. In addition, $\frac{\partial^2 r_3^*}{\partial h\partial c}=1-\frac{1}{2\sqrt{D_3}}\frac{2-h(1-c)}{h(1-c)}+A$ where $A=\frac{1-h(1-c)}{4h}D_3^{-\frac{3}{2}}\frac{dD_3}{dc}=\frac{[1-h(1-c)]^2}{8h^3(1-c)^3}D_3^{-\frac{3}{2}}$. $A<\frac{1}{1-h(1-c)}$ because $D_3>\frac{1}{4}\left[\frac{1}{h(1-c)}-1\right]^2$; $\frac{\partial^2 r_3^*}{\partial h\partial c}<\frac{2}{1-h(1-c)}-\frac{1}{\sqrt{D_3}}\frac{1}{h(1-c)}$. When R_3 is small or α is large, D_3 is smaller and likely $\frac{\partial^2 r_3^*}{\partial h\partial c}<\frac{2}{1-h(1-c)}-\frac{1}{\sqrt{D_3}}\frac{1}{h(1-c)}<0$. Finally, $x_3^*=(2R_3-\alpha r_3^{*2})^{\frac{1}{2}}$ and thus $\frac{\partial x_3^*}{\partial c}>0$ and $\frac{\partial x_3^*}{\partial h}<0$.

$\frac{\partial r_3^*}{\partial \alpha}=-\frac{2R_3}{\alpha^2\sqrt{D_3}}$, and $\frac{\partial x_3^*}{\partial \alpha}=\frac{1-h(1-c)}{4h(1-c)}+\frac{1-h(1-c)}{8h(1-c)}\left[2-\frac{1}{\sqrt{D_3}}\frac{1-h(1-c)}{h(1-c)}\right]+\frac{R_3}{\sqrt{D_3}\alpha}\ge\frac{1-h(1-c)}{4h(1-c)}+\frac{R_3}{\sqrt{D_3}\alpha}>0$; the first inequality holds because $D_3>\frac{1}{4}\left[\frac{1}{h(1-c)}-1\right]^2$ and thus $-\frac{1}{\sqrt{D_3}}\ge-\frac{2h(1-c)}{1-h(1-c)}$. The sign of $\frac{\partial e_3^*}{\partial \alpha}$ is the same as that of $\frac{\partial x_3^*}{\partial \alpha}$.

APPENDIX 4

The optimization problem in the second-stage production remains the same, and the first-stage problem is

(4.2) $\max_{\{z,x\}}\ \pi_{T4} = \pi_M^* + az$ (4.3) s.t. $\frac{\beta}{2}z^2 + \frac{1}{2}x^2 \le R_4, R_4 > 0$

The Lagrange equation is be $L = \frac{x}{2c} + az + \delta\left(R_4 - \frac{\beta}{2}z^2 - \frac{1}{2}x^2\right)$, and the first-order conditions are $\frac{1}{2c} - \delta x = 0$, $a - \delta\beta z = 0$ and $\frac{\beta}{2}z^2 + \frac{1}{2}x^2 = R_4$. The solutions are $z_4^* = 2ca\sqrt{\frac{2R_4}{\beta^2+4\beta c^2a^2}}$, $x_4^* = \beta\sqrt{\frac{2R_4}{\beta^2+4\beta c^2a^2}}$ and $e_4^* = 1 + \sqrt{x_4^*} - p$. $\frac{\partial z_4^*}{\partial c} = \frac{a}{\sqrt{\beta^2+4\beta c^2a^2}} + \frac{8\beta c^2a^2}{2(\beta^2+4\beta c^2a^2)^{\frac{3}{2}}} > 0$, and $\frac{\partial x_4^*}{\partial c} = -\frac{2\beta z_4^*}{2\sqrt{2R_4-\beta z_4^{*2}}}\frac{\partial z_4^*}{\partial c} < 0$. The sign of $\frac{\partial e_4^*}{\partial c}$ is the same as $\frac{\partial x_4^*}{\partial c}$. $\frac{\partial z_4^*}{\partial a} > 0$ because $z_4^* = 2ca\sqrt{\frac{2R_4}{\beta^2+4\beta c^2a^2}} = 2c\sqrt{\frac{2R_4}{\frac{\beta^2}{a^2}+4\beta c^2}}$. It is clear that $\frac{\partial x_4^*}{\partial a} < 0$ and $\frac{\partial e_4^*}{\partial a} < 0$. Finally, $\frac{\partial x_4^*}{\partial \beta} > 0$ because $x_4^* = \beta\sqrt{\frac{2R_4}{\beta^2+4\beta c^2a^2}} = \sqrt{\frac{2R_4}{1+\frac{4c^2a^2}{\beta}}}$; $sign\left(\frac{\partial e_4^*}{\partial \beta}\right) = sign\left(\frac{\partial x_4^*}{\partial \beta}\right)$. It is clear that $\frac{\partial z_4^*}{\partial \beta} < 0$.

If we do not make the fixed budget assumption, then the optimization problem becomes $\max_{\{z,x\}}\ \pi_{T4} = \frac{x}{2c} + az - \frac{\beta}{2}z^2 - \frac{1}{2}x^2$; the first order conditions are $\frac{1}{2c} = x$ and $a = \beta z$. The optimal political strategy investment does not depend on the market capabilities.

APPENDIX 5

The second-stage production optimization problem remains the same, and the first-stage optimization is (4.4) $\max_{\{z,r\}}\ \pi_{T5} = [1 - h(1-r)(1-c)]\pi_M^* + az$ (3.8) s.t. $\frac{\beta}{2}z^2 + \frac{1}{2}r^2 \le R_5$. The Lagrange equation is $L = [1 - h(1-r)(1-c)]\frac{x}{2c} + az + \delta\left(R_5 - \frac{\beta}{2}z^2 - \frac{1}{2}r^2\right)$, and the first order conditions are $h(1-c)\frac{x}{2c} - \delta r = 0$, $a - \delta\beta z = 0$ and $\frac{\beta}{2}z^2 + \frac{1}{2}r^2 = R_5$. $r_5^{*2} = \frac{2R_5}{1+\frac{a^2}{\beta h^2(1-c)^2\pi_M^{*2}}}$ and $z_5^* = \frac{\sqrt{2R_5}}{\sqrt{\beta+(\frac{\beta}{a})^2h^2(1-c)^2\pi_M^{*2}}}$. It is clear that $\frac{\partial r_5^*}{\partial c} < 0$, $\frac{\partial r_5^*}{\partial a} < 0$ and $\frac{\partial r_5^*}{\partial \beta} > 0$; $\frac{\partial z_5^*}{\partial c} > 0$, $\frac{\partial z_5^*}{\partial a} > 0$ and $\frac{\partial z_5^*}{\partial \beta} < 0$.