



Decisiveness

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“If I had to sum up in a word what makes a good manager, I’d say decisiveness.”

– Lee Iacocca

“In any moment of decision, the best thing you can do is the right thing, the next best thing is the wrong thing, and the worst thing you can do is nothing.”

– Teddy Roosevelt

1 Introduction

Strong leadership is indispensable for any organization to work efficiently. Despite this pervasive view, however, it is not easy in reality to describe what leadership means, let alone how it works. The apparent problem is the inherent vagueness of the term ‘leadership,’ which offers almost as many definitions as there are attempts to define the concept (Stogdill, 1974). The notion of leadership is perhaps too broad and abstract to give a simplistic, one-dimensional, definition as it seems to encompass a wide range of characteristics such as insight, judgement, vision, passion, trustfulness and trustworthiness. Whatever it means, though, leadership skills seem to be a valuable commodity in the labor market.¹ There is little doubt that an organization thrives under good leadership while it stumbles under bad one: after all, this is why we spend so much time and effort to select CEOs, managers, politicians, deans, head coaches, and so on.

This paper is an attempt to shed light on an aspect of leadership in order to illuminate how the presence of strong leadership improves the organization’s efficiency. Since leadership is such an elusive notion, our approach is necessarily to be specific by focusing on a relatively narrowly defined dimension of leadership, which we refer to as *decisiveness*. In the present framework, decisiveness is defined as the ability to take the unconventional and unprecedented course of action whenever it is called for. Since leaders must sometimes make a bold and controversial decision in response to a change in the underlying landscape, their decisiveness potentially has profound impacts on the organization’s overall efficiency. An organization

¹For instance, Kuhn and Weinberger (2005) show that, controlling for other cognitive skills, those who occupied leadership positions earn more as adults.

led by a decisive leader can seize the moment and change the course of action in a timely fashion, whereas an organization led by an indecisive leader often waits too long, requires unrealistically strong evidence before it changes the course of action, and as a consequence excessively adheres to the status quo.

Constructing a simple model of decisiveness, we formally analyze how leadership emerges or fades in organizations. To this end, consider a problem faced by an organization consisting of a leader (a decision maker) and a follower (an expert). The leader has diverse motives and is partially motivated by career concerns as evaluated by some outside observer. The leader's role in the organization is to give direction and guidance to the follower, thereby setting the tone for the entire project. Since the leader must typically make decisions on many different issues, however, she lacks expertise in the problem at hand, and the follower's advice (evidence, ideas, etc) is indispensable to make an appropriate move. Examples of this situation abound:

1. A CEO or a divisional manager needs to solicit advice from an engineer who has expertise in existing technologies or a sales manager who has expertise in consumer tastes. The outside observer is shareholders or, more broadly, the market.
2. A politician needs to solicit advice from her professional staff (lawyers, economists, consultants and etc) about some policy issues. The outside observer is her constituency.
3. An editor of an academic journal needs to solicit advice from a referee (or the author if the paper itself is regarded as a form of evidence) to decide whether to accept a submitted paper. The outside observer is potential readers or, more broadly, the academic community.

More specifically, we consider the following situation. There are two alternative projects from which the leader must choose: the status quo project and the less conventional, yet potentially innovative, project. The status quo project is the optimal choice *ex ante*, which requires no additional information to implement. With some probability, though, some change in the underlying landscape occurs, which makes the other, less conventional, project more desirable. The follower collects evidence indicative of that change and makes an advice to the leader as to whether the change has actually occurred. The question is whether the leader

is able to make a bold move, based on the follower's advice, by taking the path less traveled when it is indeed advisable to do so. We identify situations in which the leader persists on the status quo even when the less conventional project is on average more profitable. When that happens, we say that the leader is *indecisive*.

Two aspects of the model prove to be critical, which delineates two distinct measures of the organization's efficiency: the ability to *acquire* information and the ability to *process* information. First, as stated, the leader is partially motivated by career concerns. Any mistake costs the leader as it leads to the loss of reputations, but the magnitude of the loss depends on the way the leader makes mistakes. In general, there are two ways to commit an error in a statistical decision problem like this: rejecting the correct evidence (the type I error) and accepting the wrong evidence (the type II error). The leader exhibits indecisiveness whenever the type I error is more 'excusable' than the type II error. When the leader is indecisive, she rejects the follower's evidence (in favor of the less conventional project) too often and excessively adheres to the status quo, thereby hindering the organization's ability to *process* information to adapt to a changing environment.

The other aspect is that the amount of information available within the organization is endogenous, depending on how much effort the follower expends to collect evidence. Evidently, the follower's motivation hinges crucially on the leader's decisiveness. To put the idea in context, consider a situation where the follower sees some change in the environment (such as a change in consumer tastes), but needs some extra work to polish that information to be convincing. The leader's decisiveness matters in a situation like this. If the follower believes that the leader has 'no guts' to take the unconventional path, his new information or idea will more likely be ignored, and so his costly effort will be wasted no matter how hard he works on it. Since no additional information is necessary to implement the status quo, the leader's excessive and biased attachment to the status quo only lowers the follower's motivation to make a difference, which ultimately hinders the organization's ability to *acquire* information. Through this link, the organization's ability to acquire information is influenced by its ability to process information embodied by the leader's decisiveness.

While it is intuitively clear that the follower's motivation depends heavily on the leader's

decisiveness, the converse is also true in the present context. When the follower is less motivated, the amount (or the quality) of information deteriorates. This implies that any decision reached by the organization is more likely to reflect the leader's own judgement, which certainly affects her decision making. We argue that committing the type II error in this environment is more costly because it is often taken as a sign of her own biases in tastes or opinions. As a consequence, more conscious but less decisive leaders more frequently opt for the safer option, which is the status quo project. This process illustrates a downward spiral that an organization led by an indecisive leader often falls into, which thereby illuminates an intricate nature of leadership. Led by an indecisive leader, the organization persists on the status quo, which lowers the follower's motivation. This in turn leads to less information, and the organization becomes even more inflexible, ending up with repeating the same old routines over and over.

This implication also sheds light on a classical issue of whether leaders can be made, rather than are born. Consistent with the recent leadership literature,² our analysis suggests that the nature of leadership is far more complicated than this simple dichotomy can thoroughly capture. There are certainly some innate attributes and environmental factors that make people more or less decisive, but those factors alone are not always sufficient to grasp the entire picture. There is a more intangible side of leadership in which interactions between leaders and followers are at its core. Due to these interactions, a leader who exhibits decisiveness in one occasion could easily exhibit indecisiveness in another. We thus argue, as one of our main contentions, that any attempt to single out attributes and behaviors common for effective leaders would be infertile unless it explicitly takes into account these interpersonal dependence among members of the organization.

The paper proceeds as follows. Section 2 briefly overviews the related literature, in both economics and other related fields. Section 3 sets up the model and section 4 analyzes the leader's and the follower's optimal behaviors. Section 5 discussed implications of the model especially in relation to the existing leadership literature. Section 6 takes an alternative look at the problem to explore further into the sources of indecisiveness. Finally, section 7 offers

²See section 2 for more details.

some concluding remarks.

2 Related literature

The literature on leadership is enormous and diverse, with a long history dating back at least to Plato.³ Since then, many attempts have been made to define and characterize the notion of leadership. One question, which is at the center of attention is whether leaders can be made, rather than are born. Early on, much attention had been paid to traits theories, which seek for common traits and attributes that effective leaders possess: this strand of theories hence takes the stance that leaders are born with certain traits suited to leadership. In contrast, behavioral theories seek for something unique in the way leaders behave, implying that effective leadership can be learned. Over time, however, it has become increasingly clear among leadership scholars that the nature of leadership is too complicated to be summarized by a few traits or behavioral patterns. This perception eventually gives rise to contingency theories which focuses more on situational or environmental factors that make leadership effective. One of the early attempts along this direction is made by Fiedler (1967) who argues that the effectiveness of leadership hinges on one's basic leadership style and its proper match with the underlying situation.

Most of the theories mentioned above by and large deal with transactional leadership – a type of leadership where leaders accepts the goals of the existing organization and guide followers in the direction of those established goals by clarifying role and task requirements. There is another type of leadership, called transformational or charismatic leadership, which inspires followers to transcends their own self-interests for the good of the organization (Robbins, 1994). Transformational leadership occurs when leaders and followers raise one another to higher levels of motivation and morality (Burns, 1978). The present paper is very much in the spirit of this line of literature, and some of its leading views accord well with our main contentions. We will explore more on this point later in section 5.

Despite the fact that the importance of leadership has been widely recognized in various fields, economists have only recently began to formalize the notion of leadership. One of

³See, for instance, Takala (1998) for Plato's thought on leadership.

the early attempts is made by Hermalin (1998) who formalizes the notion of leadership in the context of ‘leading by example’ where a leader transmits information by moving first.⁴ Recently, several works focus on the notion of ‘vision’ as an important characteristic of leadership. Rotemberg and Saloner (2000) model vision as a bias which makes the manager favor one project over the other. Hiring a manager with a vision can be beneficial because it reduces uncertainty as to what kind of employee initiatives will be favored later.⁵ Van den Steen (2005) also formalizes the notion of vision and shows that a leader with strong beliefs would attract employees with similar beliefs. This sorting effect gives direction to the firm and improves coordination, suggesting a channel through which strong vision can affect the firm’s performance. The present paper differs from these previous works as we focus on a different aspect of leadership from a different perspective, although our implications have some relevance to the notion of vision.

Although not directly related to the issue of leadership, there is a growing literature on the optimal institutional design (in a very broad sense) when the amount (or the quality) of information is endogenous. To name a few, Aghion and Tirole (1997) discuss how the allocation of real and formal authority influence the agent’s incentive to collect information. Dewatripont and Tirole (1999) provide a model of ‘advocates’ and explains why it is often optimal to ask some parties to defend a specific cause. Szalay (2005) examines a different context and shows how eliminating intermediate options would enhance the incentive to acquire information. Li (2001) considers decision making by a committee and shows that conservative rules enhance the marginal value of information by mitigating the incentive to free-ride. Conservatism in his paper is closely related to indecisiveness in ours. The most notable difference is that Li focuses on horizontal decision making by a committee while we focus on hierarchical decision making to illuminate the nature of leadership. We then explore when and how (excessive) conservatism arises, not as an institutional rule but as an

⁴Kobayashi and Suehiro (2005) extend this analysis by assuming that each agent can move either first or second at his own discretion and show the endogenous emergence of leadership. Building on a similar framework to Hermalin (1998), Komai et al. (2007) discusses why it is often desirable to restrict information to the leader, thereby shedding light on the reasons for the necessity of a leader.

⁵Similarly, Rotemberg and Saloner (1994) argue that a firm could be better off by committing to a specific business strategy.

equilibrium behavior, and see its impact on the organization's ability to acquire and process information.

There are also some works which examine decision making in the presence of career concerns. Morris (2001) provides a model of political correctness and illustrates how an informed advisor would bias her information in order to appear politically correct. Tamada and Tsai (2005) consider the optimal allocation of authority when the principal's reputations are on the line, and show that the principal keeps too much authority when an outside evaluator cannot observe who make the decision. Levy (2007) considers decision making by a committee whose members are motivated by career concerns, and examines the impact of transparency in the decision-making process. Among them, the most closely related work is Levy (2004) who looks at the opposite case of the present model, showing that a decision maker with career concerns tends to go excessively against the prior. The difference comes from the structure of the model where, in her model, the decision maker can acquire information on her own and that signals her ability. In contrast, we consider a case where the follower has expertise in the issue at hand and the leader must rely on his information to depart from the status quo. As we will see later, this difference gives rise to the other side of inefficient decision making where a decision maker sticks excessively with the status quo.

3 Model

3.1 Basic setup

Consider a model with a leader (female), an follower (male), and an outside observer. An organization, consisting of the leader and the follower, undertakes a project $x \in \{0, 1\}$. The value of the implemented project depends on the state of nature $\theta \in \{0, 1\}$ where the prior probability of each state is given by

$$\text{prob}\{\theta = 0\} = \pi, \text{ prob}\{\theta = 1\} = 1 - \pi, \pi > 0.5.$$

The value of the implemented project for the leader (the follower) is denoted by $v_L \in \{0, Y_L\}$ ($v_F \in \{0, Y_F\}$), which depends only on the state of nature. For simplicity, we assume that the two projects are symmetric in that $v_j = Y_j > 0$, $j = L, F$, if the right project is

implemented, i.e., $x = \theta$, and $v_j = 0$ if the wrong project is implemented, i.e., $x \neq \theta$. Given that $\pi > 0.5$, we call $x = 0$ the status quo project.

3.2 Information

Although the realized state of nature is not directly observable, the leader can observe some evidence (about the realized state) collected by the follower. Let $s \in \{\phi, 1\}$ denote the evidence where $s = \phi$ indicates that the follower obtains no evidence (or, alternatively, obtains totally irrelevant evidence which contains no information). What we refer to as the evidence can literally be some information about the state of nature, or it can be a new idea to improve the profitability of project $x = 1$. According to the latter interpretation, $s = 1$ indicates that the follower comes up with some potentially innovative idea, which could increase (though sometimes decrease) the probability that $x = 1$ succeeds from its prior probability of $1 - \pi$.⁶

The likelihood of obtaining the evidence depends on the follower's costly and unobservable effort $e \in [0, 1]$ where

$$\text{prob}\{s = 1 \mid e\} = \gamma e, \quad \gamma \in [0, 1].$$

That is, the amount (or the quality) of information available within the organization is endogenous, depending on how much cost the follower is willing to take.⁷ We abstract away any strategic aspect of communication between the leader and the follower by assuming that any information acquired by the follower is immediately shared and observed within the organization.⁸ We also assume that neither e nor s is verifiable so that a contract contingent on either of these variables cannot be written.⁹

The outside observer can observe the implemented project x and the state of nature θ but

⁶If we adopt this interpretation, it perhaps makes more sense to assume that the value of $x = 0$ is always Y_j , $j = L, F$, regardless of the state of nature whereas that of $x = 1$ is $2Y_j$ if $\theta = 1$ and zero if $\theta = 0$. Since the value of the project matters only at the margin, this alteration would not change the following analysis at all, and the problem to be solved is exactly the same.

⁷ s becomes a measure of the quality of information if we interpret $s = \phi$ as irrelevant evidence, which provides no additional information to the prior, rather than no evidence.

⁸Several recent papers explore consequences and implications of strategic communication, based on Crawford and Sobel (1982). See, for instance, Krishna and Morgan (2001), Morris (2001) and Dessein (2002).

⁹That is, the type of information that can be acquired is 'soft' in that it is an informal exchange of messages between the leader and the follower so that a contract contingent on the follower's information cannot be enforced.

nothing more. Based on these observations, the outside observer rationally updates the prior and computes the posterior belief. Let $m_{x,\theta}$ denote the posterior belief held by the outside observer conditional on the available information.

3.3 Project choice

The leader retains final authority to pick a project to implement. The leader is either rational or irrational, and the type is her private information unobservable for the follower and the outside observer. The common prior probability that the leader is rational is given by $\mu \in (0, 1)$.

The rational type, as in the usual sense, processes information in a Bayesian consistent manner, and makes a decision to maximize her own payoff. When the evidence is brought in by the follower, the rational type evaluates how reliable the evidence is. Let $r \in [0, 1] \cup \{\phi\}$ denote the reliability of the evidence where $r = \phi$ if and only if $s = \phi$. Given some realized state θ , the reliability is drawn from some distribution F_θ . Let f_θ denote its corresponding density and define $\nu := f_0/f_1$ as the likelihood ratio. We assume that the likelihood ratio is strictly decreasing in r , so that a higher r indicates that $\theta = 1$ is more likely to be realized. Note that the reliability summarizes all the additional information that subsequently becomes accessible for the leader.

The irrational type, on the other hand, randomly picks a project to implement. For simplicity, we assume that the irrational type chooses $x = 1$ with probability ω , regardless of the realized state of nature. The structure behind this irrational type is left somewhat loosely specified in order to allow for flexible interpretations. One interpretation is to regard this as the one with extreme and ungrounded opinions. For instance, suppose that the leader can observe some state-irrelevant signal on top of the evidence brought in by the follower. Upon observing this signal, the irrational type firmly (and erroneously) concludes that one or the other state is realized.¹⁰ According to this interpretation, the difference in the type signifies

¹⁰To be more precise, based on the observed signal, the irrational type believes that $\theta = 0$ is realized with probability $1 - \omega$ and $\theta = 1$ with probability ω , regardless of the realized state of nature. In this case, any subsequent information has no value, and the project choice appears to be random. The rational type, on the other hand, correctly understands that the signal contains no relevant information regarding the state of nature, and hence do not update her prior.

the difference in the ability to evaluate information. As another possibility, the irrational type can also be interpreted as the one with strong preference biases. In this case, the irrational type has a strong bias for implementing $x = 1$ ($x = 0$) with probability ω ($1 - \omega$), and implements her preferred project no matter which state is realized.

3.4 Payoffs

We employ the incomplete-contract approach where no binding agreements can be made between the leader and the follower *ex ante*. The fact that no binding agreements contingent on the outcome can be made implies that both Y_L and Y_F are exogenously given. The assumption is innocuous and bears no significance because, as we will see, our entire logic and argument are independent of the values of Y_L and Y_F in a qualitative sense.¹¹

The follower's payoff is then given by $v_F + \alpha x - c(e)$, where $\alpha \in \mathbb{R}$ measures his bias towards project $x = 1$. When $\alpha > 0$, the bias reflects a pleasure from performing a new task rather than an old routine task or from the very fact that his evidence is accepted (as academic researchers derive sheer pleasure from their papers being accepted).¹² A divergence in goals and objectives is the source of behavioral bias in our model, and we assume $\alpha \geq 0$ throughout the analysis. The cost of effort is given by c where $c' > 0$, $c'' > 0$, $c'(0) = 0$ and $\lim_{e \rightarrow 1} c'(e) = \infty$.

The (rational) leader also has somewhat biased preferences which drift apart from the organization's goal. More precisely, the leader is partially motivated by career concerns as she privately benefits from holding a high reputation (of being the rational type), which could lead to pay raises, promotions, job offers, or simply ego satisfaction. The leader's payoff is thus given by $v_L + \beta m_{x,\theta}$ where $\beta \in \mathbb{R}_+$ measures the weight given to career concerns. There are several possible ways to interpret this parameter. Our preferred interpretation, which is more appropriate in the issue of leadership, is that β reflects the leader's degree of

¹¹A more important point in this sense is that no binding agreements contingent on the project choice (or, more precisely, its novelty) can be made *ex ante*. This situation is perhaps more easily justified in the realm of politics where binding agreements of almost any kind cannot be made between politicians and citizens *ex ante*. Even in firms, however, it is extremely rare to write contracts contingent on each decision leaders make. This is partly because most of those decisions are typically neither verifiable nor describable.

¹²As we will see below, we focus on a situation where $x = 1$ is chosen only when the evidence is obtained and submitted by the follower.

selfishness: with a larger β , the leader cares more about her own private benefits and less about the organization's as well as the follower's well-being. The leader becomes more selfless and works for the organization, rather than for her own sake, as β becomes smaller.

3.5 Timing

The timing of the model is summarized as follows:

1. The state of nature $\theta \in \{0, 1\}$ is realized.
2. The follower determines $e \in [0, 1]$ and collects the evidence $s \in \{0, 1\}$.
3. The leader evaluates the submitted evidence and assesses its reliability $r \in [0, 1] \cup \{\phi\}$. Based on this assessment, she chooses the project $x \in \{0, 1\}$.
4. The outside evaluator observes θ and x , and computes $m_{x,\theta}$.

4 Analysis

4.1 The optimal project choice

Since the irrational type behaves randomly, we only need to focus on the behavior of the rational type (so whenever we say the leader, it refers to the rational type in what follows). Let $q(r) := \text{prob}\{\theta = 1 \mid r\}$ denote the leader's posterior belief about the realized state of nature, which is obtained as

$$q(\phi) = 1 - \pi \quad \text{and} \quad q(r) = \frac{(1 - \pi)f_1(r)}{(1 - \pi)f_1(r) + \pi f_0(r)} = \frac{1 - \pi}{1 - \pi + \pi\nu(r)} \quad \text{for } q \in [0, 1].$$

One can see that under the maintained assumption, $q(r)$ is strictly increasing in $r \in [0, 1]$, and hence there exists a well-defined inverse function $r(q)$. Let $G_\theta(q) := F_\theta(r(q))$ for some given posterior q .

Given that the outside observer can only observe the project choice and the outcome, the posterior belief $q(r)$ is a sufficient statistic for the leader's problem. Given some $q(r) = q$, the leader chooses $x = 1$ if and only if

$$q(Y_L + \beta m_{1,1}) + (1 - q)\beta m_{1,0} \geq q\beta m_{0,1} + (1 - q)(Y_L + \beta m_{0,0}). \quad (1)$$

Letting $y_L := Y_L/\beta$ and normalizing, we can rewrite this as

$$(2q - 1)y_L \geq q(m_{0,1} - m_{1,1}) + (1 - q)(m_{0,0} - m_{1,0}). \quad (2)$$

Notice that since $m_{0,0} > m_{0,1}$ and $m_{1,1} > m_{1,0}$, the right-hand side of (2) is strictly decreasing in q . This implies that, as long as y_L is sufficiently large, there is a (unique) interior solution, denoted by p , such that $x = 1$ if and only if $q(r) \geq p$. We shall hereafter assume that y_L is large enough to satisfy this.

As can be seen, the optimal project choice depends heavily on the evaluator's posterior belief $m_{x,\theta}$. To compute this posterior belief, define $Q_\theta(p) := \text{prob}\{x = 1 \mid \theta, e, p\}$ as the conditional probability that the rational type implements $x = 1$. The posterior belief $m_{x,\theta}(p)$, defined as a function of p , is then obtained as

$$m_{0,\theta}(p) = \frac{\mu(1 - Q_\theta(p))}{\mu(1 - Q_\theta(p)) + (1 - \mu)(1 - \omega)}, \quad m_{1,\theta}(p) = \frac{\mu Q_\theta(p)}{\mu Q_\theta(p) + (1 - \mu)\omega}.$$

Define $M_\theta(p) := m_{0,\theta}(p) - m_{1,\theta}(p)$, which can be written as

$$M_\theta(p) = \frac{\mu(1 - \mu)(\omega - Q_\theta(p))}{(\mu(1 - Q_\theta(p)) + (1 - \mu)(1 - \omega))(\mu Q_\theta(p) + (1 - \mu)\omega)}. \quad (3)$$

Assuming that there exists an interior solution, the optimal threshold, denoted by p^* , must satisfy

$$p^* = \psi(p^*) := \frac{y_L + M_0(p^*)}{2y_L + M_0(p^*) - M_1(p^*)}. \quad (4)$$

Among other variables, the optimal threshold depends on the effort level chosen by the follower. Although we cannot in general rule out the possibility of multiple fixed points for some given effort level, we suppose in the subsequent analysis that there exists a unique optimal threshold, which is again the case when y_L is sufficiently large (or, equivalently, β is sufficiently small).¹³ Given this, the leader's best response function is denoted as $p^* = \Phi_L(e)$.

We take p^* as a measure of *decisiveness*, which determines the organization's ability to process information. For expositional clarity, we say that the leader is indecisive when $p^* > 0.5$, just decisive when $p^* = 0.5$, and overly ambitious when $p^* < 0.5$. It immediately follows from (4) that the leader exhibits indecisiveness if and only if $M_0 + M_1 > 0$. The following result establishes a sufficient condition for the emergence of indecisiveness.

Proposition 1 *The leader exhibits indecisiveness, i.e., $\Phi_L(e) > 0.5$ if $\omega > e$.*

¹³To see this, note that as $\beta \rightarrow 0$ and $y_L \rightarrow \infty$, p^* uniquely converges to one half.

PROOF: See Appendix.

When less information is available within the organization, it is difficult to make the right change at the right time. Making a bold move in this environment proves to be risky since it is more likely to be taken as reflexive of the leader's own personal biases in tastes or opinions. As a consequence, the status quo becomes the safer option for the leader and persists over time. Generally speaking, the leader tends to exhibit indecisiveness when the follower's effort level is sufficiently low. Moreover, we can push this logic a bit further and show that an exogenous decrease in e generally makes the leader less decisive, illustrating critical interactions between the leader and the follower.

Proposition 2 $\Phi_L(e)$ is decreasing in e .

PROOF: We need to show that, fixing p constant, an increase in e shifts $\psi(p)$ downwards. Notice that an increase in e has the same effect as a decrease in p . We can then apply Lemma 1 (in Appendix) to prove the proposition.

Q.E.D.

Figure 1 shows this graphically.¹⁴ A dotted line straight up at $p^* = 0.5$ indicates the point at which the leader is just decisive, and anywhere right of this line is the region where she exhibits indecisiveness. As the figure clearly illustrates, the leader indeed exhibits indecisiveness for a wide range of parameters. In what follows, therefore, we primarily focus on the case where $p^* > 0.5$ so that the leader exhibits some degree of indecisiveness. Notice that this result draws clear contrast to Levy (2004) who shows that a decision maker with career concerns deliberately stays away from the status quo to signal her ability. Among other things, the most notable difference lies in the way the decision maker obtains information. Levy considers a case where the decision maker differs in her ability to acquire information and the type of reputation she looks at is with respect to this ability. In this case, 'staying with the prior' reflects the lack of information which in turn reflects the lack of ability. In our model, on the other hand, the decision maker differs in her ability to process and evaluate

¹⁴For all of the figures that follow, we specify that $F_0(r) = r(2-r)$ and $F_1(r) = r^2$. Under this specification, since $f_0(r) = 2(1-r)$ and $f_1(r) = 2r$, $\nu(r) = (1-r)/r$ is indeed strictly decreasing in r as assumed.

information, and hence ‘staying with the prior’ does not necessarily signals her incapability. This is especially so when less information is available since choosing the status quo is the rule rather than the exception in this case.

[figure 1 about here]

4.2 The optimal effort

The follower’s motivation to collect information depends crucially on the leader’s decisiveness, as an indecisive leader cannot effectively utilize any acquired information. Given some threshold, the follower’s problem is formulated as follows:

$$\max_{e \in [0,1]} \gamma e \left(\pi(1 + G_0(p))(y_F - 1) + (1 - \pi)(1 - G_1(p))(y_F + 1) \right) + (1 - \gamma e)\pi y_F - \frac{c(e)}{\alpha \mu},$$

where $y_F := Y_F/\alpha$. The first-order condition is given by

$$(1 - \pi)(1 - G_1(p))(y_F + 1) - \pi(1 - G_0(p))(y_F - 1) = \frac{c'(e)}{\alpha \gamma \mu}, \quad (5)$$

For any given p , there is a unique e that can satisfy this as long as the left-hand side is nonnegative. Let $e^* = \Phi_F(p)$ denote the optimal effort as a function of the threshold p , where $e^* = 0$ if there exists no interior solution. The optimal effort level determines the organization’s ability to acquire information.

The left-hand side of (5) reflects the marginal benefit of effort which reflects the follower’s motivation to collect information. When $\alpha = 0$ and the follower has no preference bias, his motivation is maximized when the leader is just decisive, i.e., $p = 0.5$. In general, one can see that the optimal effort increases with the leader’s decisiveness up to some point and then decreases past that point.

Proposition 3 $\Phi_F(p)$ is single-peaked and maximized at \bar{p} where $\bar{p} = 0.5$ if $\alpha = 0$. If $\alpha > 0$, then $\bar{p} < 0.5$.

PROOF: $\Phi_F(p)$ decreases with p if and only if

$$-(1 - \pi)g_1(p)(y_F + 1) + \pi g_0(p)(y_F - 1) < 0 \Leftrightarrow \nu(r(p)) < \frac{(1 - \pi)(y_F + 1)}{\pi(y_F - 1)}. \quad (6)$$

Since ν is strictly decreasing, Φ_F must be single-peaked and there must exist some $\bar{p} \in (0, 1)$ at which Φ_F is maximized. Note that $\bar{p} = 0.5$ when $\alpha = 0$, and an increase in α lowers \bar{p} .

Q.E.D.

By design, no additional information is necessary to implement the status quo project. From the follower's viewpoint, therefore, his effort could have some value only when the leader chooses to implement $x = 1$. After all, why would he have to spend time and effort to collect information or agonize over coming up with new ideas if he knows that this input will be ignored anyway? When the amount of information available within the organization is endogenous and depends on the follower's unobservable effort, it is imperative to keep his motivation high enough. The leader's decisiveness plays a crucial role in this sense.

4.3 Decisiveness and efficiency

The strategic dependence between the leader and the follower yields several efficiency implications. Before we move into the equilibrium analysis, we momentarily treat the leader's decisiveness as if it is exogenous and examine how a change in p affects the follower's expected payoff as well as the organization's welfare.

We first consider the follower's expected payoff to see what type of leader is desirable from the follower's viewpoint. Generally, the follower prefers a more decisive leader because she would pay attention to his information. As it turns out, the follower's expected payoff is maximized at a point where his effort level is maximized. When the follower is biased towards $x = 1$ and hence $\bar{p} < 0.5$, he prefers a leader who is to some extent overly ambitious. This result is fairly intuitive to understand. For a follower who places some value in implementing $x = 1$ regardless of its outcome, it is desirable to have a leader who is willing to take chances.

Proposition 4 *The follower's payoff is maximized at $p = \bar{p}$.*

PROOF: The follower's payoff is maximized when, using the envelope theorem,

$$\pi g_0(p)(y_F - 1) - (1 - \pi)g_1(p)(y_F + 1) = 0. \quad (7)$$

By definition, this condition holds at $p = \bar{p}$ (see (6)).

Q.E.D.

Now consider how the organization's welfare, measured by the expected value of the implemented project, varies with the leader's decisiveness. First, when $\alpha = 0$ and the follower has no preference bias, his motivation is maximized at $p = 0.5$. This level of decisiveness also selects the project in the most efficient way, and hence the expected value is maximized at this point. When $\alpha > 0$, however, there arise a tradeoff between decision making and effort provision. At $p = \bar{p}$, the follower's motivation is maximized, but this level of decisiveness is inefficient in that it chooses $x = 1$ too frequently. An increase in p towards one half improves the project choice but at the expense of a decrease in effort. The expected value is therefore maximized somewhere along the way. The following statement summarizes this result.

Proposition 5 *The expected value of the implemented project is maximized at $p = \tilde{p}$ where $\tilde{p} = 0.5$ if $\alpha = 0$. If $\alpha > 0$, then $\tilde{p} \in (\bar{p}, 0.5)$.*

PROOF: See Appendix.

5 Discussion

There are some innate attributes and environmental factors that are necessary to be an effective leader, but those exogenous factors are hardly sufficient to grasp the entire picture. To fully understand how leadership emerges or fades in an organization, we also need to pay close attention to interactions among members of the organization, which calls for an equilibrium analysis of decisiveness. An equilibrium of this economy consists of a pair (p^*, e^*) such that $p^* = \Phi_L(e^*)$ and $e^* = \Phi_F(p^*)$. Formally, the equilibrium level of decisiveness is given by a fixed point $p^* = \Phi_L(\Phi_F(p^*))$.¹⁵ The simple setup described above allows us to conduct various comparative statics analyses which illuminate several key determinants of decisiveness and how a change in each of these factors influences the equilibrium outcome.¹⁶ This section discusses implications of each of those factors to shed light on an intricate and intertwined nature of decisiveness or, more broadly, leadership in general, especially in its

¹⁵Since this is a continuous mapping from $[0, 1]$ onto itself, the existence of at least one equilibrium is guaranteed.

¹⁶For most of this section, we focus on cases where there is a unique interior equilibrium.

relation to the existing leadership literature. Although our motivation and approach differ to a large extent, our main contentions and implications are closely in line with some of the leading views of this literature.

5.1 Transformational leadership: Burns (1978)

An emerging field of leadership is what is called the transformational leadership theory. Burns (1978) was one of the first to introduce the concept of transformational leadership where transformational leaders offer ways that transcend their followers' self-interests and short-term goals. According to Burns, transformational leadership occurs when leaders and followers raise one another to higher levels of motivation and morality. This notion of leadership draws clear contrast to the earlier view of transactional leadership which focuses more on the tangible side of leadership.

The present framework offers an insight that has a close connection to transformational leadership. The equilibrium analysis reveals that the leader's decisiveness and the follower's motivation go hand in hand and influence each other. The way this mutual dependence emerges in our model is through the diversification of responsibility. When the follower is poorly motivated, he is less likely to bring in useful information or innovative ideas. Making drastic changes from the status quo is then more likely to be taken as the leader's idea which reflects her own personal biases, and mistakes in this context are hence more costly for the leader. As a consequence, she is forced to be conservative and, in terms of the present model, indecisive. This leads to an even further decline of the follower's motivation, illustrating a downward spiral into which an organization led by an indecisive leader often falls. The contrast is clear when the follower is highly motivated and new ideas are abundant, which creates an atmosphere of 'doing something new' in the organization. Mistakes (of making unnecessary changes) are certainly inevitable in a situation like this, but the cost associated with them is not that significant because they may be due to the wrong information brought in by the follower and hence less reflexive of the leader's own biases. This process gives rise to a virtuous cycle where with the leader becoming more decisive, the potential value of information increases and so does the follower's motivation.

Due to this complementary interdependence, a leader who happens to be decisive in one occasion could easily exhibit indecisiveness in another. This could explain why traits theories fail to find a set of innate attributes commonly possessed by leaders or why behavioral theories fail to find a consistent pattern of behaviors that make leaders effective. Even when we focus on a narrow aspect such as decisiveness, the workings of leadership are far-reaching and intertwined. There is only so much we can learn from leaders' observable traits and behaviors, and we hence need to look carefully into the mechanism behind it.

This implication also sheds light on a classical issue of whether leaders can be made, rather than are born. To put it short, our answer is that neither view is entirely correct, which is basically consistent with the recent leadership literature. There are many independent factors which influence and reinforce each other to make leadership more or less effective. Among them, the role of interpersonal interactions proves to be subtle and critical. We argue that no leader can produce effective leadership all by herself as good followers is a critical ingredient of it. This complementary loop gives rise to the intangible side of leadership which is not easily captured by observable traits and behaviors.

5.2 Charismatic leadership: Conger and Kanungo (1998)

Another concept of leadership, which is closely related to transformational leadership, is what is called charismatic leadership.¹⁷ One of the most influential works along this line is Conger and Kanungo (1998), who isolate five key characteristics of charismatic leadership. Among them, the following three are of particular relevance to our analysis:¹⁸

1. Engages in unconventional behavior to achieve organizational goals.
2. Takes high risks and self-sacrifice for the sake of the organization.
3. Has a vision and the ability to articulate that vision.

¹⁷The distinction between transformational and charismatic leadership is not particularly clear. Conger and Kanungo (1987) explains that charismatic leadership is the most exemplary form that transformational leaders could assume. Here, we do not aim to draw a line between the two concepts as it is clearly out of the scope of this paper.

¹⁸The other two are sensitivity to the environment and sensitivity to member needs. The first refers to the leader's ability to recognize the environmental constraints including other members' skills and abilities. The second posits that the leader must exhibit sensitivity to other members' needs and feelings and develop mutual liking and respect.

The first point, that leaders engage in unconventional behavior to achieve organizational goals, is the main theme throughout the paper, and we do not have much more to add at this point. The remaining two characteristics are worth some investigation, and we attempt to interpret their claims in our context.

Self-sacrifice

One important determinant of decisiveness is β which is the weight attached to the leader's career concerns. This parameter is clearly important because, when $\beta = 0$, the leader's goal coincides with the organization's, which is to maximize the expected value of the project, and hence the project choice is always efficient. As β increases, though, the leader's goal gradually diverges from the organization's, and the project choice becomes less efficient in exchange for her private gains in reputations. In short, the leader becomes more trustworthy as β approaches zero.

Formally, note first that the follower's best response $\Phi_F(p)$ does not shift in response to a change in β . We thus only need to focus on $\Phi_L(e)$ to see its effect. With some algebra we obtain

$$\frac{\partial \psi}{\partial \beta} > 0 \Leftrightarrow M_0 + M_1 > 0.$$

meaning that an increase in β shifts Φ_L upward if and only if $M_0 + M_1 > 0$. It seems natural that a leader whose first priority is on her own well-being cannot be effective, regardless of whether she exhibits indecisiveness or not. If $M_0 + M_1 > 0$ and the leader exhibits indecisiveness, an increase in β makes her even less decisive.¹⁹ The figure illustrates the effect of an increase in β , indicating how a leader with strong ego preferences would lose her decisiveness.

[figure 2 about here]

What is essential in this vein is trust for the leader, defined as a positive expectation that another will not act opportunistically (Robbins, 2004). To be an effective leader, it is certainly critical for the followers to feel that they are headed into the right direction and

¹⁹If $M_0 + M_1 < 0$ and the leader is overly ambitious to begin with, an increase in β makes her even more ambitious. In either case, not surprisingly, an increase in β could only make the leader's decision less efficient.

their interests are protected under her leadership. This inherently requires that the leader be altruistic and benevolent, or at least do not abuse her authority to pursue her own interests. An effective leader is the one who cares about the organization's overall performances, rather than her own private benefits, and hence the spirit of self-sacrifice is an essential requirement for leaders of any kind to be successful.

Vision

While trust for the leader is often touted as one of the most important aspects of effective leadership, the notion of trust has many different dimensions as does the notion of leadership. One dimension is, as described just above, the trust that the leader does not abuse her authority for her own private benefits. Equally important, if not more, is another dimension of trust, that is, the trust for the leader's vision, often defined as the ability to predict the future course of action that should be followed by the organization. In this present setup, the rational type can be regarded as a leader with a vision because the irrational type is totally incapable of correctly predicting the future. The trust for the leader's vision is then partially captured by the prior belief μ where the leader is more trustworthy when μ is higher.

We then ask the following question: are leaders with high reputations (for their vision) more decisive? The effect of high reputations on $\Phi_L(e)$ is in general ambiguous as it yields two opposing effects. On one hand, leaders with high reputations have more to lose, consequently making them more conservative and indecisive, especially when the amount of information is relatively small. In our binary setup, on the other hand, high reputations (or low reputations for that matter) are also established reputations which do not depend much on the content of *ex post* information. Since the leader's reputations are firmly secured, she could care less about her career concerns and hence be more decisive. Due to the interaction between these two effects, it is not clear whether high reputations *per se* make the leader more decisive or not.

Although its effect on $\Phi_L(e)$ is not clear, an increase in μ also influences the follower's motivation as well, i.e., trustworthiness matters. More trust in the leader's vision unambiguously enhances the incentive to collect information because it increases the probability that

the acquired information is processed properly. When the follower is unsure of the leader's qualifications and does not trust her vision, the organization can acquire less information, which yields an adverse effect on the leader's decisiveness. We take this side of trust to be much more significant. This effect is normally strong enough, and an increase in the prior belief μ is hence more than likely to improve the leader's decisiveness. It is not just better assessment skills that those with high reputations tend to possess, but also their high and established reputations *per se* that help the leader make the correct decision. The leader's highly regarded credentials enhance the follower's motivation, which in turn improves the leader's decision making.

Figure 3 illustrates how more trust in the leader's vision enhances the organization's ability to acquire and process information. In this particular example, an increase in μ shifts $\Phi_L(e)$ upwards and hence makes the leader slightly less decisive. This adverse effect is, however, more than offset by an increase in $\Phi_F(p)$ so that the equilibrium level of decisiveness increases. In this case, therefore, more trust for the leader's vision significantly enhances the organization's overall efficiency as it improves both the ability to acquire information (an increase in e^*) and the ability to process information (a movement of p^* towards one half).

[figure 3 about here]

5.3 Other environmental factors

Besides those factors discussed thus far, there are also other environmental factors that influences the leader's decisiveness. Here, we raise those factors and offer our interpretations of them.

Stability

One factor that proves to be crucial is the stability of the underlying environment. The underlying environment is regarded as more stable, and fewer changes are expected when π is closer to one. Since the status quo becomes more likely, an increase in π generally shifts $\Phi_L(e)$ upwards, thereby making the leader less decisive. To see this, note that $Q_\theta(p) =$

$e(1 - F_\theta(r(p)))$ and, holding p constant,

$$\frac{\partial Q_\theta}{\partial \pi} = -ef_\theta \frac{\partial p}{\partial \pi} = \frac{ef_\theta \nu}{\pi(1 - \pi)\nu'} < 0. \quad (8)$$

Since a decrease in Q_θ increase M_θ , it follows from Lemma 1 that $\Phi_L(e)$ shifts up in response to an increase in π .

The follower's motivation is also influenced by a change in π . It is easy to see from (5) that an increase in π unambiguously decreases the optimal effort if $y_F > 1$. This is again intuitive because with fewer changes expected, the *ex ante* marginal value of the evidence naturally becomes smaller: in fact, if $y_F > 1$, there exists some $\bar{\pi} \in (0, 1)$ such that the optimal effort converges to zero as $\pi \rightarrow \bar{\pi}$. See figure 4 for how the stability of the environment adversely affects the organization's ability to acquire and process information.

[figure 4 about here]

Trustfulness

As a slightly different interpretation, consider the case of an academic journal where $x = 0$ is a rejection and $x = 1$ is an acceptance. The leader in this context is the editor who must decide whether to accept a submitted paper, and the follower is the author who submitted the paper.²⁰ In this case, π reflects the editor's prior belief that a submitted paper is of publishable quality where a low π reflects the author's highly regarded academic reputations.²¹ We can then ask the following question: does the author's high academic reputations help the editor to make the right decision? The answer, in the light of the previous argument, is affirmative in that the editor needs less convincing evidence (perhaps in the form of referee reports) to accept the paper when the author is highly regarded and π is relatively small and close to one half.²²

²⁰In this interpretation, $s = \phi$ may correspond to a situation where the submitted paper clearly does not match the standard of the journal and is summarily rejected.

²¹When applied to the case of an academic journal, one may need to make one alteration to the baseline model since a rejection is normally not observable to outside parties, implying that $m_{0,1} = m_{0,0} = \mu$. This difference, however, would not change the substance of the argument.

²²When π goes below one half, an acceptance now becomes the status quo, and the totally opposite story applies. In the case, the editor tends to accept too many papers.

This line of reasoning may also explain why path-breaking papers – even those written by the very best of our profession – are sometimes rejected by those top journals. One of the most remarkable stories is perhaps George Akerlof’s paper on ‘the market for lemons’ which best exemplifies how difficult it is to accept an unconventional, yet highly innovative, paper.²³ Refereeing is not an exact science in any discipline, and mistakes (wrongful acceptances and wrongful rejections) are bound to happen in either direction. The editorial process becomes more conservative when editors care more about minimizing wrongful acceptances than minimizing wrongful rejections. Granted that this is true, the present framework provides a mechanism that gives rise to conservatism in the editorial process. Since π reflects the editor’s prior assessment relative to the standard of the journal, it is naturally very close to one for some top journals. As a consequence, the editors of top journals are wary of accepting bad papers that should not be accepted, and the fear of wrongful acceptances makes them highly cautious and conservative in their acceptance decisions.

We can easily extend this argument to other contexts. In a broader scope, π is interpreted as the leader’s prior belief about the follower’s ability to ‘make things happen.’ The same argument then applies here: leaders need to be more trusting and more open-minded to new ideas, so that they are flexible enough to change the course of action when necessary. The lack of flexibility or trust makes the leader less decisive and is hence costly for the organization.

Predictability

The cost of collecting the evidence partially reflects how difficult it is to predict a change in the environment. This aspect is captured by γ where we say that the situation is less predictable when γ is smaller. The impact of a decrease in γ (or an increase in the cost of information acquisition) is straightforward to understand as its only effect is to shift $\Phi_F(p)$ downward. With less information available, a failure to make a change, when it is indeed necessary, is often acceptable in less predictable situations. As a consequence, the leader is more prone to stick with the safer option, which is the status quo, and the organization loses its ability to adapt to changes in the environment. It is important to note that the

²³Three journals had rejected his paper until *QJE* finally accepted it. See Gans and Shepherd (1994) for more details as well as other remarkable instances of rejected classic papers.

difficulty in making a timely change in less predictable situations arises not only because useful information is harder to come by, but also because the organization is less adept at using that information.

[figure 5 about here]

5.4 Ungrounded optimism

Since the leader is often indecisive and her decision is inefficient, optimistic beliefs about some aspects of the underlying environment could improve the organization's efficiency even when they are totally ungrounded. In our model, there are two distinct ways through which ungrounded optimism works. One way, which is more describable than the other, is through the optimistic estimation of such parameters as β , μ and π . For instance, ungrounded optimism about the leader's selflessness (a low β) or vision (a high μ) enhances the follower's motivation while that about π (a low π) enhances the leader's decisiveness. In any event, these optimistic beliefs enhances the organization's overall efficiency to acquire and process information.

Since the leader's decisiveness and the follower's motivation are complementary (in the region where the leader exhibits indecisiveness), there possibly exists multiple equilibria. In such a case, optimistic beliefs work in a less visible way. Suppose that there are two equilibria, (p_A^*, e_A^*) and (p_B^*, e_B^*) , where $p_A^* < p_B^*$ and $e_A^* > e_B^*$. Equilibrium A is the better equilibrium in that the leader is more decisive and the follower is more motivated. In the absence of proper coordinating devices, however, it is not a given that the organization reaches the more efficient equilibrium. The sequential nature of our model would not necessarily resolve this problem because what matters is the outside observer's belief: if the outside evaluator somehow believes that the organization is at equilibrium B, then there is no reason for either the leader or the follower to deviate unilaterally from it.²⁴ This suggests that leadership may emerge or fade by some invisible forces sustained through mythical beliefs.

²⁴To see this more precisely, note that the follower's effort is not observable to the outside observer. The follower hence cannot influence the observer's belief by changing his effort level. Given this, the leader obviously has no reason to change her decision rule.

6 Sources of indecisiveness: an alternative look

In statistical decision problems, wrongful rejections (choosing $x = 0$ when $\theta = 1$) are referred to as the type I error while wrongful acceptances (choosing $x = 1$ when $\theta = 0$) are referred to as the type II error. Let E_1 (E_2) denote the probability of the type I (type II) error occurring, which is computed as

$$E_1 = (1 - \pi)(1 - e(1 - G_1(p^*))), \quad (9)$$

$$E_2 = \pi e(1 - G_0(p^*)). \quad (10)$$

Now define the loss function $L := \alpha_1 E_1 + \alpha_2 E_2$, where $\alpha_i > 0$ is the weight attached to the type i error. The threshold that minimizes this loss function, denoted as p^{**} , is then given by

$$\nu(r(p^{**})) = \frac{\alpha_1(1 - \pi)}{\alpha_2\pi}. \quad (11)$$

In the present model, from the organization's viewpoint, the cost of the type I error is identical to that of the type II error since the projects are symmetric. This means $\alpha_1 = \alpha_2$, in which case $p^{**} = 0.5$. As can easily be imagined, the organization minimizes the expected loss when the leader is just decisive.

In this alternative view, indecisiveness emerges whenever $\alpha_2 > \alpha_1$, i.e., the type II error is more costly than the type I error from the leader's viewpoint. In our model, the type II error tends to be more costly because, with no information, the rational type would choose the status quo and hence be more vulnerable to the type I error. This conversely means that the irrational type is more prone to commit the type II error, and hence committing the type II error leads to a great loss of reputations. In short, anyone can take an unconventional path if it has a value in itself, as it is the case for the irrational type. It is, however, much harder to do this at the right time, especially when things are less predictable. Because of this, the status quo emerges as the safer option, making the leader less willing to make a bold and controversial move. Although we point out only one possibility, there are presumably other possible channels through which indecisiveness emerges: anything that makes the type II error more costly can be a source of indecisiveness.

When a person faces some decision to make, there are generally two ways to commit an error: do nothing (when something should have been done) and do the wrong thing. If we interpret that ‘do something’ is $x = 1$ and ‘do nothing’ is $x = 0$, the former corresponds to the type I error while the latter to the type II error. Of course, there is *a priori* no reason to believe that one type of error is more problematic than the other as it certainly depends on the underlying context. Despite this, many people seem to believe that there are too many type I errors but not enough type II errors in decision making. This view is best exemplified by Teddy Roosevelt – one of the preeminent leaders of the American history – who is quoted as saying “the worst thing that a leader can do is do nothing rather than do the wrong thing.” This quote is compelling as it seems to reflect his belief that too many decision makers are afraid of doing the wrong thing and rather content with doing nothing, suggesting that indecisiveness is a fairly common problem in organizations.

7 Conclusion

This paper explores how the presence of strong leadership influences the organization’s ability to acquire and process information. The key concept is the leader’s decisiveness, which gives us an angle to look into the diverse and vague notion of leadership. Our simple model illustrates how leadership emerges or fade in organizations and how the leader’s decisiveness plays a part in it. We also argue, as one of our main contentions, that mutual trust between leaders and followers is a critical ingredient of effective leadership, to the extent that it can even be ungrounded. The importance of mutual trust suggests that an important mission that leaders must fulfill is to convince that they are trustful as well as trustworthy. In fact, CEOs seem to understand the importance of trustfulness and trustworthiness: experimental evidence by Fehr and List (2004) shows that CEOs are considerably more trusting and exhibit more trustworthiness than students. In future, works along this line are needed to further inquire into the nature of leadership as a complicated interpersonal phenomenon.

Appendix

PROOF OF PROPOSITION 1: We first show that ψ is strictly increasing in p as long as there exists an interior solution. To show this, with slight abuse of notation, we treat ψ as if it is a function of M_0 and M_1 . The following result is convenient.

Lemma 1 *ψ increases if both M_0 and M_1 increase.*

PROOF OF LEMMA 1: Total differentiation yields

$$d\psi = \frac{(dM_0 + dM_1)y_L + dM_1M_0 - dM_0M_1}{(2h + M_0 - M_1)^2}. \quad (12)$$

A sufficient condition for $d\psi < 0$ is

$$(dM_0 + dM_1)y_L + dM_1M_0 - dM_0M_1 > 0. \quad (13)$$

Since $dM_0 > 0$ and $dM_1 > 0$, this condition holds if $y_L \geq M_1$, which is equivalent to $\psi(p^*) \leq 1$.

Q.E.D.

This result implies that, to see how ψ responds to a change in p , we only need to focus on its impact on M_0 and M_1 . Notice that both M_0 and M_1 are strictly increasing in p , because $m_{0,\theta}$ is strictly increasing while $m_{1,\theta}$ is strictly decreasing in p . This means that ψ is strictly increasing in p .

By this result, the leader's decisiveness must be bounded between $\psi(0)$ and $\psi(1)$. Given that $p > 0.5 > 1 - \pi$, $Q_\theta(p) = e(1 - G_\theta(p))$, and

$$\psi(0) = 0.5 + \frac{\beta\mu(1 - \mu)(\omega - e)}{2y_L(\mu(1 - e) + (1 - \mu)(1 - \omega))(\mu e + (1 - \mu)\omega)},$$

$$\psi(1) = 0.5 + \frac{\beta\mu}{2y_L(\mu + (1 - \mu)(1 - \omega))}.$$

If $\omega > e$, then $\psi(0) > 0.5$, which implies $\Phi_L(e) > 0.5$.

Q.E.D.

PROOF OF PROPOSITION 5: Let $z(p)$ denote the probability of implementing the right project as a function of p , which is given by

$$z(p) = \pi + \Phi_F(p) \left((1 - \pi)(1 - G_1(p)) - \pi(1 - G_0(p)) \right). \quad (14)$$

Note first that, by definition, $\pi g_0(0.5) = (1 - \pi)g_1(0.5)$, $\pi g_0(p) > (1 - \pi)g_1(p)$ for $p \in [0, 0.5)$ and $\pi g_0(p) < (1 - \pi)g_1(p)$ for $p \in (0.5, 1]$. Note also that $(1 - \pi)(1 - G_1(0)) < \pi(1 - G_0(0))$ and $(1 - \pi)(1 - G_1(1)) = \pi(1 - G_0(1)) = 0$. This implies that there must exist some $\bar{q} \in (0, 0.5)$ such that $(1 - \pi)(1 - G_1(\bar{q})) = \pi(1 - G_0(\bar{q}))$, $(1 - \pi)(1 - G_1(\bar{q})) < \pi(1 - G_0(\bar{q}))$ for $p \in [0, \bar{q})$ and $(1 - \pi)(1 - G_1(\bar{q})) > \pi(1 - G_0(\bar{q}))$ for $p \in (\bar{q}, 1]$. It is then easy to observe that for any given $\Phi_F(p) \geq 0$, $z(p) \leq \pi$ for $p \in [0, \bar{q}]$. Since $z(\bar{q}) = \pi$ by definition, we can focus on $[\bar{q}, 1]$ to find the global maximum.

Differentiating with respect to p yields

$$z'(p) = \Phi_F(p) \left(\pi g_0(p) - (1 - \pi)g_1(p) \right) + \frac{d\Phi_F}{dp} \left((1 - \pi)(1 - G_1(p)) - \pi(1 - G_0(p)) \right). \quad (15)$$

To show that $\tilde{p} \in (\bar{p}, 0.5)$, we need the following two facts. First, as we have seen above, $\pi g_0(0.5) = (1 - \pi)g_1(0.5)$, $\pi g_0(p) > (1 - \pi)g_1(p)$ for $p \in [0, 0.5)$ and $\pi g_0(p) < (1 - \pi)g_1(p)$ for $p \in (0.5, 1]$. Second, by proposition 3, $d\Phi_F/dp = 0$ at $p = \bar{p}$, $d\Phi_F/dp > 0$ for $p \in [0, \bar{p})$ and $d\Phi_E/dp < 0$ for $p \in (\bar{p}, 1]$. It follows from these that $z'(p) < 0$ for $p \in [0.5, 1]$ and hence $\tilde{p} < 0.5$. Given this result, it suffices to show that $\tilde{p} > \bar{p}$. First, this is the case if $\bar{p} \leq \bar{q}$, because $\tilde{p} \geq \bar{q}$. Now suppose that $\bar{p} > \bar{q}$. In this case, for $p \in [\bar{q}, \bar{p}]$, $z'(p) > 0$. Since $z'(0.5) < 0$, this proves $\tilde{p} \in (\bar{p}, 0.5)$.

Q.E.D.

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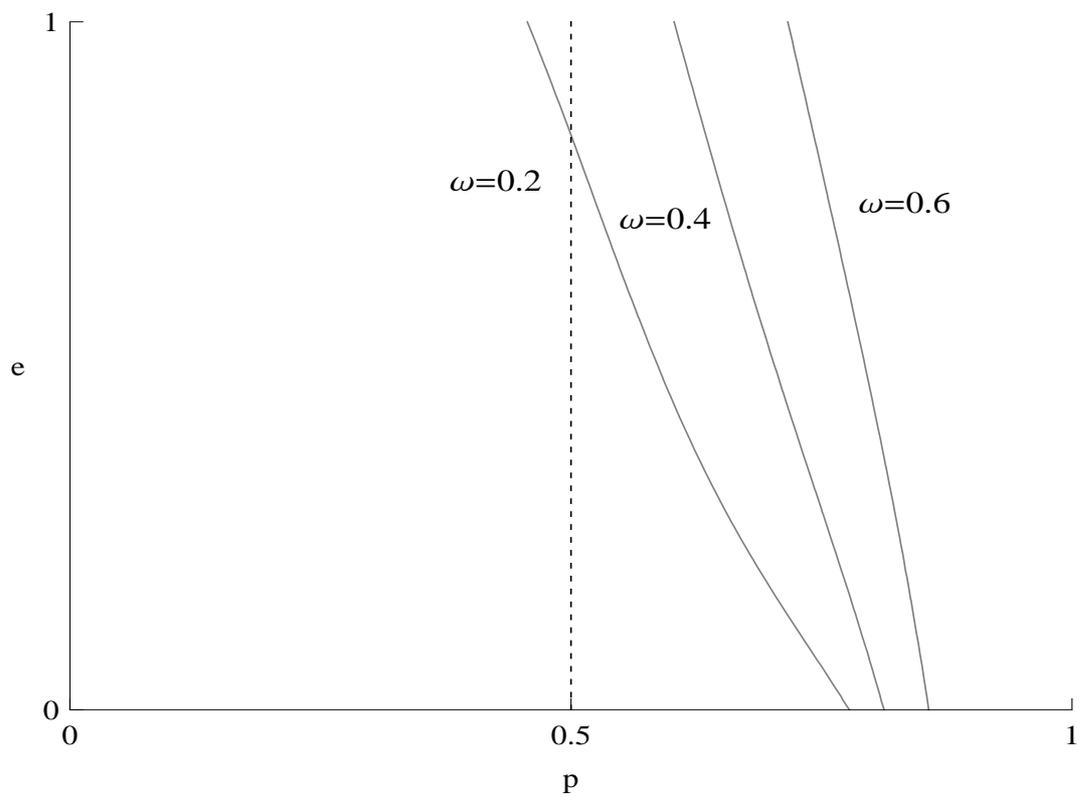


Figure 1: The leader's decisiveness $\Phi_L^{-1}(p)$.

Note: $v_L = 1$, $\mu = 0.4$, $\pi = 0.7$.

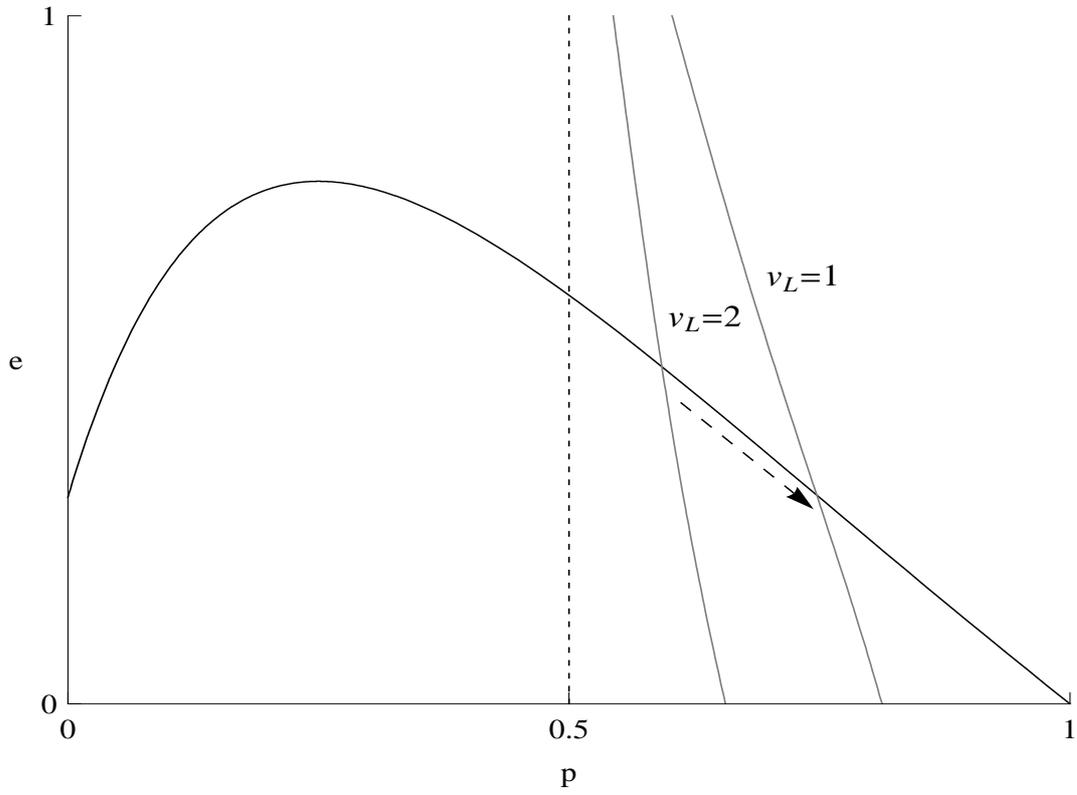


Figure 2: The effect of a decrease in v_L .

Note: $v_F = 2$, $\mu = 0.5$, $\pi = 0.7$, $\omega = 0.4$, $\gamma = 1/3$.

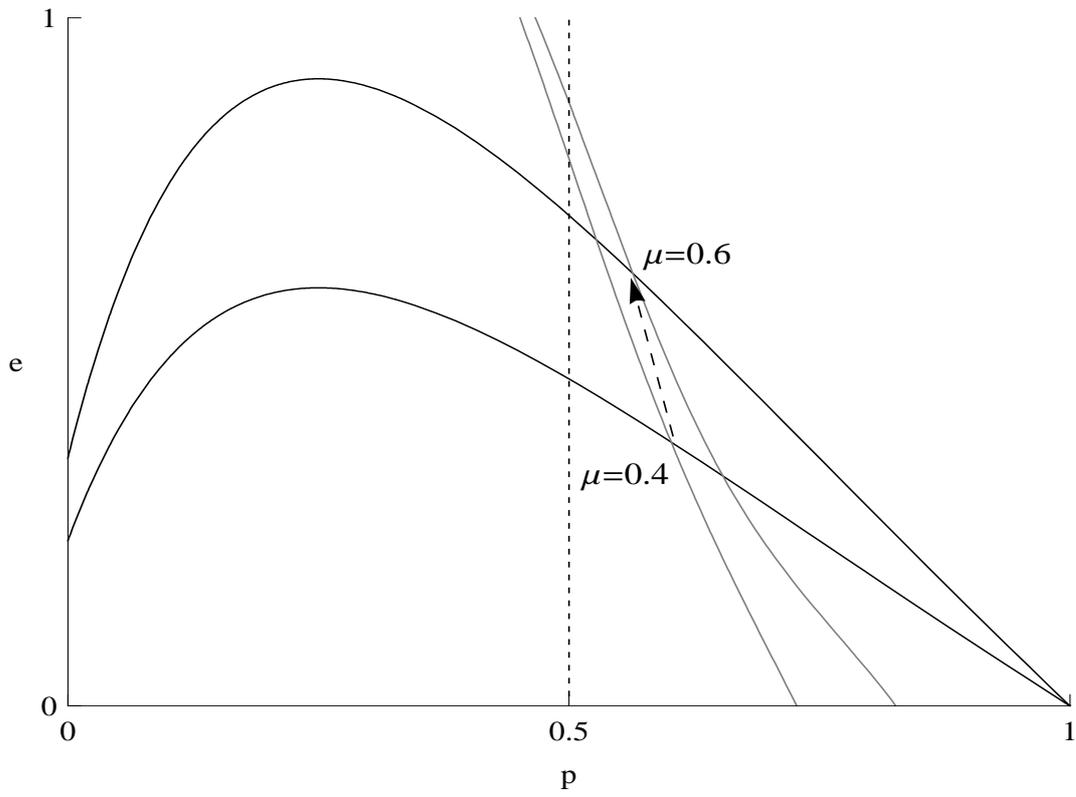


Figure 3: The effect of an increase in μ .

Note: $v_L = 1$, $v_F = 2$, $\pi = 0.7$, $\omega = 0.2$, $\gamma = 1/3$.

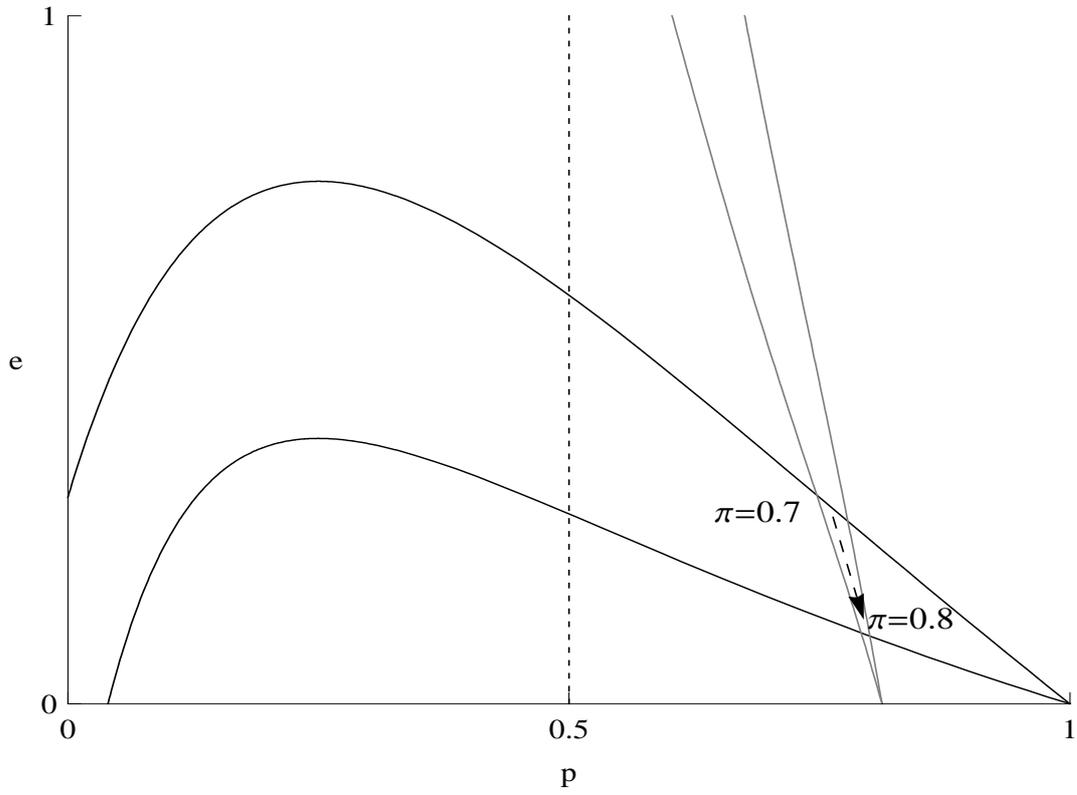


Figure 4: The effect of an increase in π .

Note: $v_L = 1$, $v_F = 2$, $\mu = 0.5$, $\omega = 0.4$, $\gamma = 1/3$.

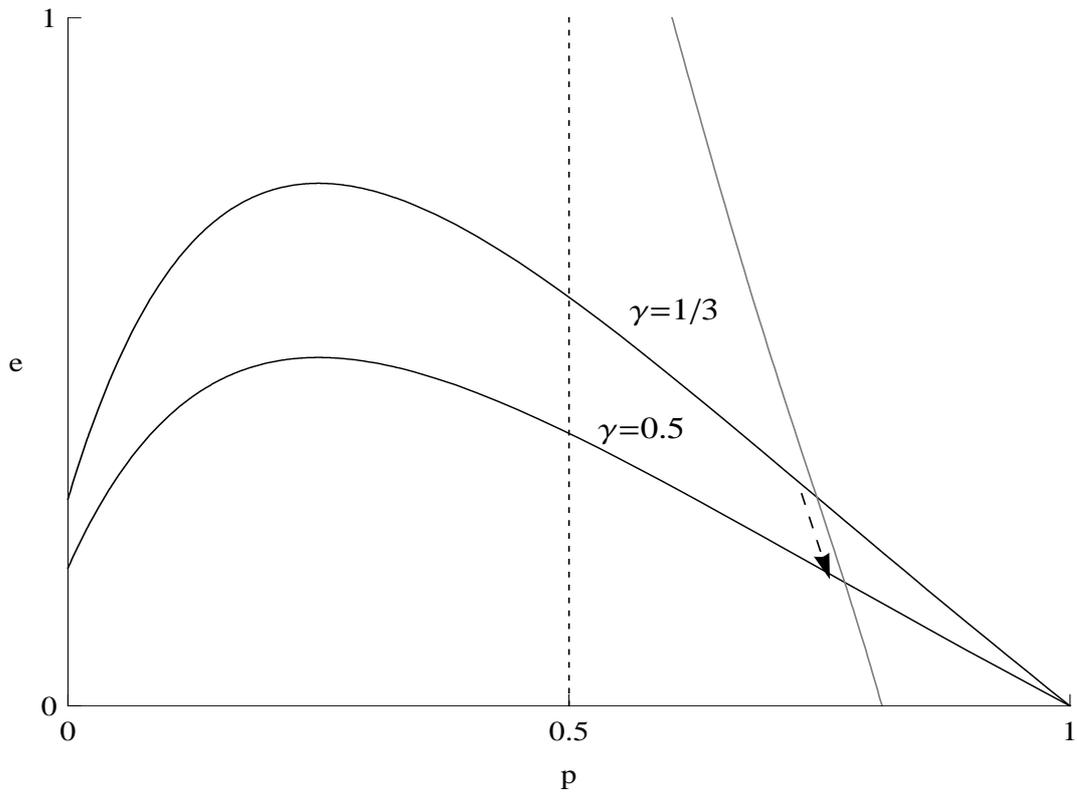


Figure 5: The effect of an increase in γ .
 Note: $v_L = 1$, $v_F = 2$, $\pi = 0.7$, $\mu = 0.5$, $\omega = 0.4$.