

Why organizations fail: models and cases*

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Abstract

Organizations fail due to incentive problems (agents do not want to act in the organization's interests) and bounded rationality problems (agents do not have the necessary information to do so). This survey uses recent advances in organizational economics to illuminate organizational failures along these two dimensions. We combine reviews of the literature with simple models and case discussions. Specifically, we consider failures related to the allocation of authority and short-termism, both of which are instances of “multitasking problems”; communication failures in the presence of both soft and hard information due to incentive misalignments; resistance to change due to vested interests and rigid cultures; and failures related to the allocation of talent and miscommunication due to bounded rationality. We find that the organizational economics literature provides parsimonious explanations for a large range of economically significant failures. (JEL: D21, D86, J33, L23, M52.)

1 Introduction

Schumpeter (1975[1942], pp. 82-85) noted that businesses fail because the world changes. A particular business idea requires a specific set of (largely sunk) investments in physical

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and human capital. The value of these investments depends on a particular bet regarding the future match between tastes and technology. When the bet goes wrong or when the conditions that made it successful change, companies often have no choice, regardless of their organizational features, but to abandon their activities and shut down.

This survey is concerned with a different class of failures: those that result from (ex-ante) poorly designed organizations. Our objective is twofold: to use the insights of contemporary organizational economics to understand organizational failures, and to use these failures to better understand the organizational economics literature. Our focus is on large-scale organizational failures – failures that would have justified significant organizational change.

Organizational failures are useful devices for discussing the insights of the organizational economics literature for two reasons. First, large-scale failures are not only economically important but also highly visible. As a result, postmortem analyses offer unusually rich and detailed accounts of the functioning of an organization at a particular point in time. Second, large failures potentially illuminate which of the many choices that the organizational designer made are important and which ones are incidental, an exercise that is more difficult to perform in a well-functioning organization.

The study of failures is not without pitfalls. Hindsight bias may lead us to see predictable failure where in fact only chance is at work. In addition, we are looking at a selected sample of firms: those that suffer failures could be different in other ways from average firms. This problem is in principle compounded by the risk of cherry picking cases that fit our own biases. In the conclusion, we partially address this concern by applying our framework to the ten largest bankruptcies in the U.S. At any rate, for these reasons, our inferences must by necessity be exploratory and cautious. We use the failures as parables rather than as direct evidence of causal links.¹

In principle, the price system can coordinate self-interested agents when relevant knowledge is dispersed among them. Such coordination, however, requires that agents are aware of a vast number of prices – in the extreme, all Arrow-Debreu securities – and can react accordingly in real time. As Arrow (1974) notes, individuals have a bounded capacity to acquire information, a problem that, as Milgrom and Roberts (1992) note, is particularly

¹For each of the failures we discuss, the reader may wonder what “ultimately” caused the organization to adopt an erroneous structure. Although one could attempt to offer reasons, such as bounded rationality, lack of leadership (e.g. Bolton et al., 2013), or behavioral biases of the organizational designer, the evidence does not usually provide fine grained insight into the minds of organizational designers. We therefore avoid speculating on these ultimate causes. The microstructure of our models however does suggest causal mechanisms behind the failures.

acute when real-time coordinated action is needed. Organizations can relax this bounded rationality constraint and thus bring more information to bear on each decision. For this reason, Arrow concludes that “organizations are a way of achieving the benefits of collective action in situations where the price system fails.”

Throughout, we combine reviews of the literature (mostly theoretical) with models and case discussions. By weaving these models with accounts of failures, we hope to bring the theory to life. Moreover, we complement our analysis of failures with brief discussions of organizations that have succeeded despite facing similar challenges. Combined with the insights of the models, such successful organizations suggest possible organizational changes that may mitigate the problems we study.

Agents fail to act together because they do not want to (an incentive problem) or they do not know how to (a bounded rationality problem). Incentive problems arise due to the presence of asymmetric information or imperfect commitment, which lead agents to act according to their own biases or preferences rather than in the interest of the organization (e.g. Holmstrom, 1979, Shavell, 1979). Bounded rationality problems arise due to agents’ cognitive limitations and finite time, which mean that even if they want to, agents cannot compute the solution to every problem, nor can they make themselves precisely understood by others (e.g. Simon, 1955, Marshack and Radner, 1972, Arrow, 1974).

Incentive problems occupy the bulk of our survey (Sections 2-5). We begin by studying failures related to the allocation of authority (Section 2). Decentralized authority has the advantage of incorporating the information of each individual but risks missing benefits from coordination and economies of scale. A flawed allocation of authority has the potential to lead to organization-wide failures, such as the failure of the merger between Daimler and Chrysler.

Next, we study failures caused by short-termism (Section 3). This problem arises when an agent with wide discretion is rewarded by high-powered, short-term incentives. As we will show, such agent selects apparently-safe projects in order to capture short-term rewards at the cost of placing the organization at risk of catastrophic failure. For instance, the implosion of some financial service companies, such as AIG, during the financial crisis provides a rich illustration of this phenomenon.

The above two types of failures fall under the category of “multitasking problems.” As first noted by Holmstrom and Milgrom (1991) and by Baker (1992), in this type of problems a lack of balanced incentives leads agents to focus excessively on one task (particularly, in the

cases we consider, on the most individualistic tasks with short-term observable returns). In the first case, agents must split their efforts between collective and individual tasks, leading to a ‘static’ multitasking problem. In the second case, agents trade-off short-term payoffs against long-term organizational survival, leading to a form of intertemporal multitasking.

We then turn to the study of communication failures due to incentive misalignments (Section 4). We begin with the classic problem in which an informed subordinate transmits soft information to his uninformed boss (e.g. Crawford and Sobel, 1982), leading to coarse communication (Section 4.1). The cover up of a large trading scandal in London provides a case study of this problem. We then propose a simple model that captures a novel mechanism implicated in large failures. In this model, a subordinate conceals valuable but potentially compromising information from his boss in order to protect the boss from the consequences of such knowledge: the so-called “cover-your-ass” or CYA phenomenon (Section 4.2). Examples of this problem are common. For instance, in the recent 2014 torture (“enhanced interrogation”) controversy in the U.S., the U.S. President appears to have been deliberately kept ignorant, in his own interest, of potentially compromising details.

We close our study of incentive problems by considering the difficulties that organizations experience in adapting to changes in the environment for organizational reasons (Section 5). Organizations must be able to change and adapt their routines, cultures, and power structures as the outside world changes. This aspect, first analyzed by Kreps (1990), is so far the least developed in the literature. We first consider rivalries among rent-seeking coalitions, which we use to study failures due to resistance to change (Section 5.1), such as the failure of airlines to develop low-cost subsidiaries and the inability of the NYSE to introduce electronic trading. We then study failures to adapt to change due to rigidities in culture and relational contracts (Section 5.2). For instance, we discuss the long struggles of HP to adapt its ‘HP Way’ to the needs of the PC era.

Bounded rationality problems are the subject of Section 6. We begin by studying the allocation of talent in hierarchies. Failures result from a mismatch between a position and the talent of the agent occupying such position, as for example in the Spanish Cajas debacle (Section 6.1). We then study coarse communication and organizational codes, where failures result from miscommunication due to incompatible languages, as in some merger “culture clashes” (Section 6.2).

From a theoretical perspective, for accessibility and clarity, we have kept our models as simple as possible. With one exception, these models are distilled versions of existing models

that allow us to understand key features of the cases.² More realistic and complex versions of the models can be found in the literature we survey. We have also attempted to economize on the models by using them for various categories of failures when applicable.³ Each model is designed to illustrate how a single mechanism plays a causal role in failure cases of interest. Of course, the failure cases we study tend to be complex with multiple factors at play. For this reason, the models are also designed to complement one another.

Neither in our study of the theory, nor in our case discussions, have we aimed to be exhaustive. Our goal in selecting theory topics is to cover a wide scope of failures. Moreover, since our focus is on organizational (multi-agent) decision failures, we have abstracted with a single exception (short-termism) from single-agent problems. For instance, we do not cover failures due to bad individual decisions stemming from individual behavioral biases, even in the absence of faulty incentives. For a survey of the impact of individual biases on organizations, see, for example, Camerer and Malmendier (2007). In addition, we do not discuss the classic problems of moral hazard (e.g. risk-incentive trade-offs and empire building). These classic problems were the main focus of the literature on organizations in the first two decades since the work of Holmstrom (1979) and Shavell (1979).⁴ In such models, agents are assumed to perform a single task (technically, the action is single-dimensional, such as a choice of effort or an investment level). The most widely studied case involves aversion to effort by agents, leading them to underperform. Agents may also have preferences for empire building (e.g. Jensen, 1986), leading them to overinvest: for example, a driver of some mergers may not be a desire to create value for shareholders, but instead a manager’s desire to run a larger company.⁵ Finally, our focus is on the (organizational) economics liter-

²The only model that is not derived from previous work is the CYA model of Section 4.2, which concerns communication failures in the presence of potentially compromising information that an employee withholds from his boss in order to protect him.

³Three of our models involve a two-agent *coordination problem* in which an organization faces a trade-off between synergies and local adaptation. We use this coordination problem to discuss three aspects of organizational design for which synergies and local adaptation are especially relevant: allocation of authority, relational contracting and culture, and coarse communication across agents. Two of our models involve a *sender-receiver problem* in which a boss must decide whether or not to interrupt a project before maturity on the basis of information gathered by a subordinate. We use this problem to study communication failures in the presence of incentive misalignments. The three remaining models involve stand-alone problems: a version of the single-agent *variational problem* of Aumann and Perles (1965) of selecting an optimal lottery in the presence of non-convex objectives, which we use to analyze short-termism; a *technology adoption problem* under incomplete contracts in which coalitions may successfully block change; and a *talent allocation problem* in which scarce talent is optimized through leverage.

⁴Extensive recent reviews of this literature can be found in Gibbons (1998) and Prendergast (1999, in this journal). See also the reviews of Gibbons and Roberts (2013b) and Lazear and Oyer (2013).

⁵As a result, firms generally face a trade-off between misaligned incentives and monitoring costs (see e.g.

ature, and so we do not cover the large literature in non-economics organizational behavior and psychology.⁶ Concerning our selection of cases, we have inevitably excluded important failures, most notably those involving criminal activity (such as the ENRON accounting manipulation or Bernie Madoff’s securities fraud).

The organizational economics literature has recently witnessed a large development, as exemplified by the arrival of a recent Handbook (Gibbons and Roberts, 2013a). In addition, a growing availability of firm-level datasets has facilitated a rapid growth of empirical work to accompany the older theoretical literature. The empirical work has fallen along three lines. First, some work uses inside-the-firm survey style information on organizational practices. Examples include Ichniowski et al. (1997), Baker and Hubbard (2004), Bloom and Van Reenen (2007), Garicano and Heaton (2010), and Bloom et al. (2014). These papers have focused on issues such as the impact of technological change on management practices – including the allocation of authority. Second, there is a growing number of laboratory experiments, such as for example Camerer and Weber’s (2003) study of communication in mergers. Third, there is a new effort to undertake field experiments on organizations, including Bandiera et al. (2007) and Bloom et al. (2012). Below, we discuss several results from this growing literature that are relevant for the present topics.

Each section is structured as follows. We open with a brief explanation of the problem of interest and a literature review. We then present a model that captures a specific failure mechanism. Finally, we discuss failure cases and, for contrast, briefly illustrate some cases of success.

2 Decentralized authority and coordination failures

A basic problem organizations face is that information about local conditions (e.g. the costs of a plant, the peculiarities of the demand conditions in a market) is generally dispersed and known only to local managers. In markets, the decentralized price system allows for the

Bertrand and Mullainathan, 2000, for evidence on this point) and in some cases the resulting misalignments may be so large as to lead to catastrophic failures.

⁶Specifically, we do not cover organizational psychology, which, dating at least from Janis (1972), studies groupthink as well as psychological factors deriving from the characteristics of top managers, such as their tenure (Mone et al., 1998), homogeneity (Pitcher and Smith, 2001), and potential flaws bred by success (Miller, 1990); nor do we cover organizational ecology, which analogously to the industrial organization literature in economics, focuses on characteristics that favor selection and survival of organizations, such as age (Stinchcombe, 1965), size (Hannan and Freeman 1984), density (Hannan et al., 1991), and life cycle (Balderston, 1972).

efficient use of this local knowledge.⁷ In organizations, as Jensen and Meckling (1990) argue informally, *adaptation* to dispersed local knowledge (meaning allowing decisions to match local conditions) requires decentralizing authority to those individuals with local knowledge, while at the same time granting them high-powered incentives to align their goals with those of the organization.⁸

Decentralization, however, comes at a cost: it does not allow gains from *synergies* (meaning economies of scale/scope), typically available in organizations, to be fully materialized. For instance, a powerful division manager may purchase components that suit his own division rather than seeking standardized components that reduce company-wide costs. The difficulty is a multitasking problem, first introduced by Holmstrom and Milgrom (1991) and first applied in the context of decentralization by Athey and Roberts (2001). In a multitasking problem, agents must divide their efforts, time, and attention among different tasks (e.g. individual versus collaborative ones), thus effectively making these tasks substitutes for one another. Moreover, an agent’s contribution to output is generally easier to measure and reward along some dimensions (e.g. individual tasks, in which only one agent is involved) than others (e.g. collaborative tasks), and agents naturally gravitate toward spending more effort on the easy-to-reward task. By delegating decision rights to agents with local knowledge, the organization ensures a strong performance on individual tasks, at the cost of reducing effort on collaborative ones; instead, by centralizing decision rights, it can ensure that collaborative tasks are undertaken, at the cost of a reduced performance on individual ones.⁹

In more recent work, Dessein et al. (2010) study the optimal degree of adaptation to local conditions, at the cost of losing synergies across agents, in a setting in which individual efforts must be simultaneously incentivized. They argue that both the power of incentives and the allocation of decision rights can contribute to solving these problems. Specifically,

⁷Hurwicz (1973) points out the parallel between discussing the allocation of authority in firms – to either headquarters or to semi-autonomous divisions – and the historical debate about the benefits of centralized (socialist) versus decentralized (market) economic systems. Hayek (1945) and others argued for the superiority of the market based on its informational efficiency and incentive compatibility (given the impossibility of getting all local knowledge to a planner) while Lange (1936, 1937) and others argued that centralized allocations could reproduce the market allocation while being better able to take externalities and public goods into account, akin to ‘synergies’ inside organizations.

⁸Following Fama and Jensen (1983) and Bolton and Dewatripont (2013), we define authority as a boss’s power to initiate projects, to direct, monitor, and exact obedience from subordinates, and to reward them for good performance.

⁹As shown by Athey and Roberts (2001), an alternative way to focus effort on either individual or collaborative tasks is to use incentive pay. Broad (company-wide) incentives motivate collaboration; narrowly focused ones motivate individual initiative. In the discussion that follows, the distinction between using authority and incentive pay is immaterial.

capturing synergies requires either lowering the power of individual incentives (and making them broader) or centralizing decision rights. In similar settings, Alonso et al. (2008) and Rantakari (2008) abstract from effort incentives but allow managers to communicate their local knowledge via cheap talk.¹⁰

To illustrate the trade-off between synergies and adaptation, consider the FBI. A field agent must choose between pursuing leads that will help solve individual cases assigned to him and working with others to find broad patterns that may prevent terrorist attacks. The importance of individual tasks (crime-fighting) in the FBI has led it to be historically a highly decentralized (and successful) organization. Yet such decentralization crucially led to the major intelligence failure in the run up to the 9/11 attacks (see 9/11 Commission Report, 2004).

Although systematic empirical work on these questions is difficult by nature, some recent work has made progress on the determinants of decentralization both inside firms and between firms (e.g. franchise contracts). Inside firms, Thomas (2011) shows that, in line with the moral-hazard explanation we pursue here, decentralized product choice leads firms to have an excessively broad product range. Acemoglu et al. (2007) find that the more the technology used by a firm is in the public domain, the higher its degree of centralization; whereas firms closest to the technological frontier are more likely to choose decentralization, consistent with a higher value of local knowledge. Bloom et al. (2012) show that decentralization is larger where trust is higher, suggesting that a loss of control is relevant when considering decentralization decisions. Between firms, measures of decentralization are perhaps more objective given that decision rights are codified in contracts (in contrast, work on firms must rely on subjective questionnaires). Arruñada et al. (2001) show that the extent of delegation to automobile dealers is larger for decisions involving local knowledge (e.g. pricing and after-sales service are normally delegated), whereas the importance of horizontal externalities across car dealers limits delegation. Finally, and also pointing in the direction of the theory discussed here, Windsperger (2004) shows that the less important a franchisor’s knowledge, the less the franchisor controls decision rights.

¹⁰Friebel and Raith (2010) and Rantakari (2013) also study the interaction between organizational structure (the allocation of decision rights) and information flows in cheap-talk settings. In related work, Hart and Moore (2005) abstract from effort and communication incentives, and instead focus on the allocation of authority. They show that when gains from coordination are large, “generalists” at headquarters should be granted authority. In contrast, when local expertise is sufficiently important, “specialists” in the field should be granted authority. Van den Steen (2010) shows that when agents have different (prior) beliefs, high-powered incentives limit coordination by leading agents to act according to their own beliefs instead of obeying instructions.

Below we consider a simple model of coordination inspired by Bolton and Farrell (1990) and Dessein and Santos (2006).¹¹ We use this model to study the optimal allocation of authority in the presence of trade-offs between synergies and local adaptation – which are a central aspect of the cases that follow. In the model, synergies are represented by assuming that two agents have access to a joint task that succeeds only if both agents collaborate on that task, and local adaptation is captured by assuming that agents can alternatively participate in individual tasks that do not require collaboration and whose value is unknown to their boss.

Model 1. Baseline coordination game

There are two agents, 1 and 2, and a principal. Agents can either work together on a joint task and generate value $V > 0$ or work separately on local/individual tasks, in which case each agent $i = 1, 2$ generates value $v_i \in [0, 1]$. For instance, the agents may represent two restaurants that can either share a common format (a chain) and harmonize their menus (obtaining synergies and value V), or adapt the menu to the demand of their own customers (obtaining v_i in each market i). Similarly, the agents may represent two auto manufacturers who may either choose a common platform for their higher- and lower-end models, obtaining synergies, or may instead fully adapt the models to their own local markets. We assume that if agent i works on the joint task while agent j works on his individual task, then agent i generates zero value (i.e. he gives up the value of local adaptation while at the same time failing to exploit synergies) and agent j produces value v_j . That is, the joint task features a strong form of complementarity in the spirit of Kremer’s (1993) O-ring theory: a team project only succeeds if no collaborator makes a mistake in his particular task.¹² Under such complementarity the first-best decision rule is simple: agents should work together if and only if the synergies are large enough, that is $V \geq v_1 + v_2$.

Suppose V is known to all, while each v_i is known to both agents, but not to the principal – only the agents are informed of relevant local conditions and know the value of adapting to them.¹³ For simplicity, suppose each v_i is distributed uniformly over $[0, 1]$ and independently

¹¹The model differs from Bolton and Farrell in that the interaction between agents is one-shot and their decisions are complements, not substitutes; it differs from Dessein and Santos in that we employ a simpler technology.

¹²The O-ring technology gets its name from a famous catastrophic failure: the Challenger shuttle exploded, killing its seven crew members, when a single component (an inexpensive rubber sealer called the “O-ring”) failed to contain fuel during launch.

¹³Alternatively, we could have assumed that each agent i knows V and the value of his individual task v_i

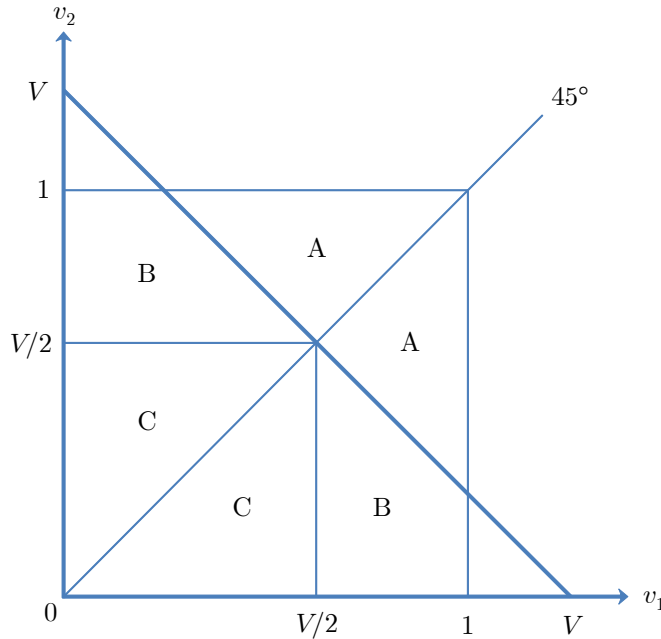


Figure 1: Baseline coordination game. Centralization leads to excessive coordination: an uninformed principal implements the joint task, worth V , too often, incurring losses whenever the combined value of the individual tasks $v_1 + v_2$ is high (area **A**). Decentralization leads to insufficient coordination: agents fail to coordinate on the joint task whenever the value of *any* of their individual tasks is high (area **B**). In area **C**, both forms of authority are equivalent and deliver output V .

across individual tasks. Finally, we assume that $V < 2$, otherwise the first best would be trivially implemented by always ignoring the individual tasks.

In this setting, we take “coordination” to mean that agents successfully collaborate on the joint activity. Thus, in the spirit of Roberts (2004), and the organizational economics literature more broadly, an organization may suffer from excessive coordination when agents fail to fully adapt their actions to their local environments and instead align them too closely with one another. The present notion of coordination is distinct from two other concepts that are often labeled coordination. In popular use, coordination often means efficiency (and thus we could never have “too much coordination”). In game theory (e.g. Schelling, 1960) coordination involves agents agreeing on which equilibrium to select among a number of possible ones.

We now compare, in the light of information asymmetries, the merits of centralized and

only. As we shall see, this alternative assumption would deliver the same outcome described below provided agents can costlessly communicate with one another.

decentralized decision-making:

Decentralized authority. Consider first a decentralized arrangement in which each agent simultaneously decides, on the basis of all local information (v_1, v_2) , whether or not to participate in the joint task. We assume that if an agent does participate, he receives 50% of the proceeds of the joint task (i.e. $\frac{1}{2}V$ if his peer participates as well, and zero otherwise).¹⁴ If agent i instead participates in his individual task, he receives a payoff v_i .

This decentralized arrangement leads to a non-cooperative game between the agents. In the most efficient equilibrium of this game, agents participate in the joint task if $\max\{v_1, v_2\} \leq \frac{1}{2}V$ and work individually otherwise (see Figure 1 for reference).¹⁵ This equilibrium delivers the following expected payoff:

$$\underbrace{\Pr\left[\max\{v_1, v_2\} \leq \frac{1}{2}V\right] V}_{\text{Expected joint output}} + \underbrace{\Pr\left[\max\{v_1, v_2\} > \frac{1}{2}V\right] \mathbb{E}[v_1 + v_2 \mid \max\{v_1, v_2\} > \frac{1}{2}V]}_{\text{Expected individual output}}, \quad (1)$$

where the first term represents output created under the joint task (which agents select in area **C** of Figure 1) and the second term represents output created under the individual tasks (which agents select in areas **A** and **B** of Figure 1). The resulting overall expected output is greater than 1. Indeed, agents could guarantee an expected overall output of $\mathbb{E}[v_1 + v_2] = 1$ by simply ignoring the joint task – an outcome they strictly improve upon by sometimes exploiting the joint task when it is efficient to do so.¹⁶

Note that decentralization has the disadvantage of yielding too little coordination, as agents only coordinate if it is in each agent’s individual interest (the resulting inefficiency arises in area **B** of Figure 1, in which $V > v_1 + v_2$). In the parlance of the business literature, only “win-win” synergies are implemented. As a result, for instance, restaurant menus would

¹⁴This assumption represents an environment with maximal incentives for participating in the joint task in the sense that the agents are the full residual claimants of their joint output.

¹⁵The decentralized game has a weak-link property: joint output V is destroyed if at least one agent fails to participate in the joint task. As a result, the game has multiple equilibria with various degrees of coordination. For example, any of the following strategy profiles is an equilibrium: agent i participates in the joint task if and only if both v_1 and v_2 are below a cutoff $\hat{v} \in [0, \frac{1}{2}V]$. There also exist asymmetric equilibria in which the agents participate in the joint task if and only if v_1 is below a cutoff $\hat{v}_1 \in [0, \frac{1}{2}V]$ and v_2 is below a different cutoff $\hat{v}_2 \in [0, \frac{1}{2}V]$.

¹⁶Note that if v_i was known to agent i only, the above equilibrium could be implemented by simply requesting that agents voluntarily share their information up front with one another: since an agent only wishes to induce his peer to participate in the joint activity when the agent also intends to participate, there are no incentives to misrepresent v_i .

not be harmonized in cases in which such harmonization would raise total surplus. The cause of this problem is the usual team free-riding problem associated to the fact that joint output is shared among agents (see Holmstrom, 1982), which in the present setting results in a multitasking problem in which agents are biased toward their individual tasks.¹⁷

Centralized authority. Following Bolton and Farrell (1990) (and in the spirit of Jensen and Meckling, 1990), the principal may potentially improve upon decentralization, despite fully ignoring the value of the individual tasks, by centralizing authority and imposing the coordinated task on the agents. In the franchise example, the principal would simply mandate a harmonized menu for both restaurants. This centralized arrangement delivers output V . Note that centralization has the disadvantage of yielding too much coordination: the principal, lacking local knowledge, fails to allow for adaptation in instances in which its value is larger than coordination (this inefficiency arises in area **A** of Figure 1, in which $V < v_1 + v_2$).

When $V \leq 1$, centralization is trivially inferior to decentralization (as decentralization delivers a value greater than 1). When $V > 1$, in contrast, the organization faces a trade-off, with centralization dominating decentralization if and only if V is sufficiently large (i.e. synergies are sufficiently valuable):

Result 1. *The centralized allocation delivers a higher surplus than the decentralized allocation if and only if V is sufficiently large (specifically, $V > \sqrt{5} - 1$).*

Proof. The centralized allocation generates surplus V , whereas the decentralized allocation generates expected surplus (1), which simplifies to $1 + \frac{1}{8}V^3$ after manipulation (indeed, $\Pr[\max\{v_1, v_2\} \leq \frac{1}{2}V] = \frac{1}{4}V^2$ and $\mathbb{E}[v_1 + v_2 \mid \max\{v_1, v_2\} > \frac{1}{2}V] = (1 - \frac{1}{4}V^2)^{-1} (1 - \frac{1}{8}V^3)$). Given that $V < 2$, the result follows from observing that $V > 1 + \frac{1}{8}V^3$ if and only if $V > \sqrt{5} - 1$.

■

In closing we note that we have imposed three important simplifications: (1) we abstract from effort considerations; (2) the principal has no information advantage relative to the agents concerning the value of coordination; and (3) tasks are either fully coordinated or fully adapted to local conditions. In practice, however, efforts affect output, the principal (by virtue of being a central manager) tends to be better informed about the value of synergies, and tasks tend to vary more continuous along the coordination vs. adaptation dimension

¹⁷Note that we have implicitly assumed that agents face costs that make it impossible to reach efficiency through Nash bargaining. These costs may include constraints on money transfers across divisions, usually a feature of firms, as well as bargaining inefficiencies due to asymmetric information (as in Myerson and Satterthwaite, 1983). Our analysis relies on the first friction. For a study of the second friction in the context of delegation, see, for example, Dessein et al. 2010.

(e.g. restaurant menus may be coordinated to various degrees).

Envision, in this richer environment, an organization that wishes to motivate each player, through high-powered incentives, to exert costly effort toward achieving goals related to the player’s expertise (i.e. rewarding the principal for achieving synergies; and the agents for success in their local markets).¹⁸ As Athey and Roberts (2001) note, a key practical difficulty is that, in light of information asymmetries, the performance measures available to reward players tend to confound the impact of a player’s effort with the impact of the player’s task design decisions. Specifically, a local manager rewarded on the basis of success in his individual market will be biased toward excessive local adaptation (a substitute for costly effort). Similarly, a central manager rewarded for success in achieving synergies will be biased toward excessive coordination (also a substitute for costly effort). As a result, the organization experiences the same basic trade-off as in our simple model, with centralization leading to excessive coordination and decentralization leading to excessive adaptation.¹⁹

Allocation of authority: some cases

Business failures often result from the inability of a corporation to implement the allocation of authority needed to find the “right” balance between adaptation to local conditions and synergies. For instance, in a variety of well-known business cases, synergies (as measured by V in the above model) increase for exogenous reasons – e.g. due to a change in technology or in demand conditions – and the organization fails to move toward a more centralized structure to capture those synergies.

A notable example is the sharp increase in economies of scale that resulted in the auto industry from the development of common platform manufacturing. This innovation allowed several car models to share basic components, causing design decisions to become highly complementary and coordination failures more costly: for the platform approach to be beneficial, multiple divisions had to adopt it.²⁰ The larger synergies led to many new mergers and alliances (for example, Volkswagen acquired Seat, Skoda, Audi, and Porsche, among

¹⁸For a formal treatment of this type of problem, which combines effort incentives for specific goals and biased decisions, see Athey and Roberts (2001) and Dessein et al. (2010).

¹⁹Given the (endogenous) biases of the players, allowing for communication between them is unlikely to resolve the inefficiencies, since principals will exaggerate the value of synergies and local managers the value of adaptation.

²⁰Before the advent of common-platform manufacturing, car manufacturers were highly decentralized (see Chandler, 1962). As a result they struggled to exploit the new potential synergies, as divisions had incentives to forego cooperation on design even when it was in the interest of the company as a whole.

others; Renault purchased a controlling interest in Nissan; Chrysler merged with Daimler first and with Fiat next).

A case in which there was a nearly complete failure was the merger of Chrysler and Daimler (the largest industrial merger ever). The allocation of authority at the merged company was poorly conceived. Top-level managers (i.e. the principal in our model) decided not to impose common standards (a lack of centralization), in spite of the large platform synergies that motivated the mergers.²¹ Indeed, DaimlerChrysler’s CEO Jürgen Schrempp “was afraid of being labeled a takeover artist [and] he left Chrysler alone for too long.” (Finkelstein, 2002, p. 7.) Consequently, the synergies on which the merger was predicated never materialized. When merger ultimately failed, a weakened Chrysler, having lost its dominance in SUV and light truck markets, was sold to a private equity firm for essentially zero (Edmondson, 2007).²²

The classic “selective intervention” logic whereby managers of a merged company only interfere when efficient (e.g. Williamson, 2002) would lead us to expect that, given the lack of centralization, the merged entity would do no worse than the previous independent companies. However, the mere presence of powerful Daimler managers in control (the merger was de facto a takeover of Chrysler by Daimler) led to a reduction in the effort and initiative of the Chrysler divisions, reducing the ability of its individual brands to be truly well adapted to local conditions: “The dynamism [of Chrysler’s managers] faded under subtle German pressure [...] managers who had built Chrysler’s ‘cowboy bravado’ [felt] withdrawn, ineffective and eclipsed by the Germans in Stuttgart.” (Finkelstein, 2002, p. 7.) This outcome is consistent with the arguments by Aghion and Tirole (1997): increasing the authority of headquarters on what projects to pursue reduces the motivation of local managers.

This case also illustrates a common phenomenon: organizations tend to find it difficult to adapt to change. Indeed, the inability of the merged firm to centralize authority may have resulted from the fact that managers, initially accustomed to a highly decentralized system in the stand-alone firms, feared losing rents following a reallocation of authority. We expand on potential reasons for resistance to change in Section 5. We also revisit the DaimlerChrysler case in the context of culture clashes in Section 6.2.

Without rising to the level of catastrophic failure, decentralized authority with high-

²¹The lack of centralization went so far, for instance, that divisional heads eventually failed to return calls from headquarters (Hannan et al., 1999).

²²Chrysler was valued at about \$36bn before the merger. After the merger failed, DaimlerChrysler announced that Cerberus would pay \$7.4 billion for 80.1% of Chrysler, but as part of the deal Daimler injected slightly more than that sum to cover Chrysler’s outstanding debt and restructuring costs.

powered individual incentives (in the model, granting agents high rewards for their individual tasks) is responsible for coordination problems in a wide range of other business cases. For instance, a recent reorganization of Sears, Roebuck & Co., which dramatically increased decentralization together with the power of individual incentives, caused major coordination problems (Kimes, 2013):

As some employees had feared, individual business units started to focus solely on their own profitability and stopped caring about the welfare of the company as a whole. According to several former executives, the apparel division cut back on labor to save money, knowing that floor salesmen in other departments would inevitably pick up the slack. Turf wars sprang up over store displays. No one was willing to make sacrifices in pricing to boost store traffic.

A similar difficulty was at the heart of the inability of the FBI to adequately respond to its new counterterrorism challenge after the first World Trade Center terrorist attack in 1993 (9/11 Commission Report, 2004). The organizational design of the FBI was historically highly decentralized, with strong career rewards for successful agents. This structure fitted well with its primary crime-fighting mission, as local knowledge is the critical ingredient of success, and such success is easy to measure (e.g. through arrests and convictions). In contrast, preventing terrorist attacks depends on the coordinated performance of many agents and organizations, rather than on the performance of a single individual or a small team. Given the FBI's decentralized allocation of authority and its strong individual incentives, agents were reluctant to coordinate across offices. Indeed, according to the 9/11 Commission Report, failures to share information in the run up to the 9/11 attacks contributed to the FBI's inability to prevent these attacks.²³

Illustration of solutions

Successful organizations vary greatly in how they allocate authority (see, for example, Simons, 2005). In one extreme, centralized firms such as Dell, Walmart, and the original Ford Motor Co. focus on standardizing their products across vast geographical regions. By exploiting economies of scale, these firms achieve cost reductions (i.e. a large V in the model) that appear to outweigh potential benefits from adapting their products to local

²³For a more detailed account of this and other intelligence-gathering failures, see Garicano and Posner (2005).

markets. In the other extreme, highly decentralized firms run the activities of their individual business units as if these units were stand-alone organizations. For example, PepsiCo runs the activities of its restaurant chains (Pizza Hut, Taco Bell, and KFC) as if they were separate companies – as in the model above, coordination effectively requires unanimity: “[D]ivision presidents should have the prerogative to decide whether or not a given division would participate in any specific joint activity.” (Montgomery and Magnani, 2001, p. 12.)²⁴

Some successful organizations have also adopted intermediate arrangements. An example is the use of divisional hybrids, in which only some functions of the organization are centralized. For instance, international consumer-oriented companies like Procter & Gamble and Nestle centralize product development, accounting and finance, and global contracts (where synergies are presumably the largest), and decentralize sales, distribution, and manufacturing.²⁵ In addition, organizations often combine decentralized authority with broad incentives to encourage some degree of cooperation between agents. For example, promotions at McKinsey & Company have an important subjective evaluation component that measures a consultant’s willingness to share knowledge with offices in other countries (see Barlett, 1997). Finally, decentralized organizations attempt to facilitate cooperation by establishing informal personal networks among employees. For instance, General Electric’s “rotational programs” promote such networks by transferring individuals across horizontal positions in different divisions.

3 Short-termism

In the previous section, we considered a form of multitasking that may be termed static in the sense that agents trade off two current-period outputs (collaborative versus individual). Also of interest to large-scale organizational failures is an intertemporal version of multitasking in which agents must choose between projects that maximize short-term objectives (e.g. making this year’s numbers) versus projects that are more consistent with long-run objectives (e.g. maximizing long-run profits).

²⁴As noted above, the extent of cooperation induced via the allocation of authority can in principle be replicated by the appropriate use of incentives. For instance, large law firms engaged in team production (such as dealing with large corporate law cases) tend to reward their professionals using “lock-step” (seniority-based) compensation, aiding cooperation across lawyers (akin to a centralized organization), while those engaged in smaller cases (such as liability litigation) rely on “eat-what-you-kill” (extreme performance-based) compensation, promoting adaptation to the needs of specific clients (e.g. Garicano and Santos, 2004).

²⁵These hybrid organizational structures are not without problems, as they reduce clarity and increase the likelihood of conflict and delay.

In financial institutions, this trade-off takes the form of choosing between short-term returns and long-term (often catastrophic) risk. Similarly, in a manufacturing context, such as in oil company BP, managers must choose between increasing current profits and investing in safety. A key way organizations motivate either short- or long-run behavior is through the form of incentive compensation they use. For instance, leading up to the financial crisis, financial institutions used high-powered, short-term pay to reward managers and traders, leading them to prioritize products that resulted in immediate profits, but that contributed to catastrophic failures during the crisis (e.g. Senior Supervisors Group, 2008, Kashyap et al., 2008).²⁶ Similarly, oil company BP provided short-term, high-powered incentives to refinery managers, leading them to reduce their focus on process safety (Baker, 2007). We return to both these cases below.

We now formally illustrate the dangers of intertemporal multitasking by means of a simple model in which an agent selects a project with an arbitrary level of risk. The model is an application of the “variational problem” of Aumann and Perles (1965): an agent who is rewarded on the basis of the realization of a (non-negative) random variable can select any distribution for this random variable he desires, subject only to the constraint that the mean of this random variable does not exceed an exogenous level. (We also consider a simple extension of this model, following Garicano and Rayo (2014), in which the agent can also expand the set of allowable distributions by exerting costly effort.)²⁷ Our interest in this variational problem is that its very essence is to expose firms to the risk of catastrophic failure.²⁸

Aumann and Perles (1965) teach us that, under general conditions, the optimal (non-negative) random variable selected by the agent in the variational problem has very simple properties. For instance, when the random variable is real-valued and the agent’s payoff is “generic,” the optimal random variable either places all mass on its expected value or places all mass on only two of its possible realizations (as illustrated in Figure 2). This type of result has appeared in recent work covering a wide range of topics, including: (1) optimal gambling

²⁶For an alternative view of the root causes of the financial crisis, in which agents were acting in the interests of their principals, see Cheng et al. (forthcoming). Relatedly, in a world with optimistic buyers, the above short-termist contracts may be optimal, as shown by Bolton et al. (2006).

²⁷The main differences between the model below and that of Aumann and Perles are: (a) our agent is rewarded by means of a simple one-step bonus; and (b) our agent selects an effort level that affects his average output.

²⁸Other forms of moral hazard can lead to catastrophic failures as well. A notable example is empire building, as illustrated by the fall of WorldCom after its enormous debt-fueled growth under the helm of Bernard Ebbers (see Pulliam et al., 2002).

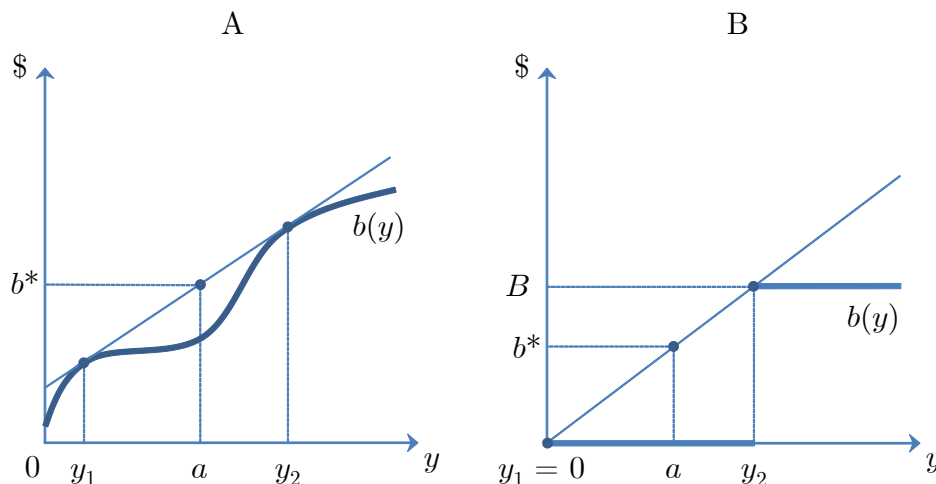


Figure 2: Variational problem. This figure presents two examples of the optimal lottery over monetary outcomes $y \geq 0$, among the set of lotteries with a fixed mean a , for a decision maker with a non-concave objective function $b(y)$ (in bold). Such lottery, with expected payoff b^* , is found by selecting the straight line that is vertically closest to a while simultaneously being everywhere weakly above the agent’s objective. The intersection of this straight line with the agent’s objective determines the values of y that receive positive probability (namely, y_1 and y_2). Panel **A** illustrates an abstract case and panel **B** illustrates the case of a “one-step bonus” analyzed in the model below, for which the optimal lottery is a gamble between the worst feasible outcome and the bonus threshold.

by households who have a concern for social status (e.g. Robson, 1992, Becker et al., 2005, Ray and Robson, 2012), which in turn leads to a positive (and stable) equilibrium level of income inequality; (2) sender-receiver games in which a sender with commitment power persuades a receiver through a strategic selection of information transmission (e.g. Rayo and Segal, 2010, and Kamenica and Gentzkow, 2011); and (3) the problem of “risk-shifting” by agents/investors who are willing to take large amounts of risk to maximize the probability of receiving a bonus (e.g. Makarov and Plantin, forthcoming), which is the application most related to the model below.²⁹

Model 2. Short-termism

Suppose a risk-neutral agent produces output $y \in [y_{\min}, \infty) \subset \mathbb{R}$ for a principal. Unlike a standard agency problem, the choice of the agent is a cumulative distribution function $F : [y_{\min}, \infty) \rightarrow [0, 1]$ over different output levels. (Below we present an extension in which

²⁹See also earlier work on risk-taking incentives by Jensen and Meckling (1976) and Diamond (1998).

the agent also selects a standard effort level.) Output y_{\min} represents a disastrous outcome, such as losing 100% of the principal’s assets. The agent can select *any* cdf F subject only to the constraint that the expected value of y under F does not exceed an exogenous constant $a > 0$:

$$\mathbb{E}[y \mid F] = \int_{y_{\min}}^{\infty} y dF(y) \leq a. \quad (2)$$

We grant the agent such extraordinary level of flexibility in order to capture, for example, the decision of a portfolio manager (who can in principle invest in a rich variety of derivatives using highly-leveraged positions), or the decision of a manager in charge of a complex and risky project, such as offshore oil drilling (who can in principle enhance short-term profitability by under-investing in safety at the cost of creating a small probability of a disastrous event).

Suppose further that the agent is paid a one-step bonus $b(y)$ with threshold $\hat{y} > y_{\min}$:

$$b(y) = \begin{cases} B & \text{if } y \geq \hat{y}, \\ 0 & \text{if } y < \hat{y}. \end{cases}$$

Finally, suppose that $a < \hat{y}$, and so given constraint (2), the agent can never receive the bonus payment B with probability one.³⁰ As we shall see, this bonus is a suboptimal arrangement. In particular, since it is based on a single realization of y , rather than being based on a rich sample of output realizations accumulated over time, it rewards short-term performance – a feature that is essential for generating the present intertemporal multitasking failure.

The agent’s problem is³¹

$$\begin{aligned} \max_F \quad & \int_{y_{\min}}^{\infty} b(y) dF(y) \\ \text{s.t.} \quad & (2). \end{aligned}$$

This problem has a simple solution:

Result 2(a). *In the short-termism model, the agent’s optimal cdf, denoted F^* , places all probability mass on two outcomes: the bonus-threshold outcome \hat{y} and the disastrous outcome y_{\min} . As a result, outcome \hat{y} occurs with probability $\Pr[y = \hat{y} \mid F^*] = \frac{a - y_{\min}}{\hat{y} - y_{\min}}$ and outcome y_{\min} (the catastrophic failure) occurs with probability $\Pr[y = y_{\min} \mid F^*] = \frac{\hat{y} - a}{\hat{y} - y_{\min}}$.*

³⁰As will become clear, if instead we had $\hat{y} \leq a$ (representing a form of lower-powered incentives) the agent would have no motivation to gamble.

³¹Aumann and Perles (1965) offer a general solution for this type of “variational problem.”

Proof. That F^* places all mass on outcomes \hat{y} and y_{\min} follows from Aumann and Perles (1965), Theorem 5.1. (This result is illustrated in Figure 2, panel **B**, for the case in which $y_{\min} = 0$.) Indeed, by placing all mass on outcomes \hat{y} and y_{\min} the agent maximizes the probability of receiving payoff B . Consequently, F^* must satisfy

$$\begin{aligned} \Pr[y = y_{\min} \mid F^*] \cdot y_{\min} + \Pr[y = \hat{y} \mid F^*] \cdot \hat{y} &= a \text{ and} \\ \Pr[y = y_{\min} \mid F^*] + \Pr[y = \hat{y} \mid F^*] &= 1, \end{aligned}$$

from which the desired probabilities of the two outcomes immediately follow. ■

Notice that $\Pr[y = \hat{y} \mid F^*]$ increases as y_{\min} falls, and this probability converges to 1 as y_{\min} converges to $-\infty$. In other words, when y_{\min} is arbitrarily small, the agent's optimal distribution assigns a vanishing probability to the disastrous event, and the remaining probability to the bonus threshold \hat{y} .³²

The implication is that, when y_{\min} is small, the agent *appears to behave in a safe way*, as he essentially places all probability weight on the single outcome \hat{y} . Moreover, the agent de facto has a short-run focus in that the disastrous outcome is exposed, in expectation, only after many periods.

Endogenous effort

We now extend the model (following Garicano and Rayo, 2014) by assuming that, in addition to selecting a cdf F , the agent exerts effort $e \geq 0$ at a cost $C(e)$ (where C is a smooth, increasing, and convex function). The agent's effort has the effect of expanding the set of available distributions he can choose from. In particular, the agent may select any cdf F subject to the constraint that the expected value of y under F does not exceed a level $\alpha(e)$:

$$\mathbb{E}[y \mid F] \leq \alpha(e), \tag{3}$$

where $\alpha(e)$ is increasing in e with $\lim_{e \rightarrow \infty} \alpha(e) < \hat{y}$. (We also assume that α is a smooth, concave function.)

Note that for any given e , the agent optimally selects the same type of cdf as before: one that places a small probability mass on y_{\min} (namely, $\frac{\hat{y} - \alpha(e)}{\hat{y} - y_{\min}}$) and the remaining mass on \hat{y} (namely, $\frac{\alpha(e) - y_{\min}}{\hat{y} - y_{\min}}$). Consequently, as a function of e , the agent's net expected payoff is given

³²As shown in Makarov and Plantin (forthcoming), the agent would optimally select an analogous cdf with two mass points only (one of which is the lowest outcome available) under a wide variety of incentive contracts with non-concave payoffs. The one-step bonus contract considered here is merely a simple example.

by

$$V(e) \equiv \frac{\alpha(e) - y_{\min}}{\hat{y} - y_{\min}} B - C(e).$$

The agent's equilibrium effort, denoted e^* , then solves $\max_{e \geq 0} V(e)$. Assuming this problem has an interior solution, we obtain

$$C'(e^*) = \frac{\alpha'(e^*)}{\hat{y} - y_{\min}} B. \quad (4)$$

Result 2(b). *In the short-termism model, the agent's equilibrium effort falls as y_{\min} falls. In other words, when the disastrous event becomes more costly to the principal, the agent optimally withdraws effort.*

Proof. Inspection of the first-order condition (4) reveals that its L.H.S. is increasing in e^* and its R.H.S. is decreasing in e^* and increasing in y_{\min} . It follows that e^* is increasing in y_{\min} , as desired.³³ ■

In summary, the model delivers two main insights. First, by being able to select a highly skewed distribution with a small probability on a disastrous event, the agent generates results that appear to be stable and highly predictable. Second, as the minimum feasible level of output drops, the agent optimally reduces his effort: effort and the ability to select a skewed distribution are, in effect, substitutes. Consequently, in addition to opening the door for catastrophic losses, short-termism destroys value by diminishing the agent's productive effort.

Short-termism: some cases

In practice, the logic of the above model holds broadly in contexts where agents can choose actions that alter the distribution of outcomes in major ways. Indeed, our reading of the evidence is that intertemporal multitasking is a pervasive cause of failures in the financial service industry. A notable example was the collapse of AIG during the recent financial crisis. The collapse was caused by AIG selling protection against losses on corporate and sovereign bonds, in the form of Credit Default Swaps (CDS) (Vasudev, 2010). The contracts specified that the bond holder would pay a (steady stream of) premia to AIG. In exchange, AIG would insure the bond holder. Sovereign and corporate bond issuers default only on rare occasions, and so the CDS issuer (the seller of protection) can expect a significant, steady income source

³³Note, using a similar argument, that e^* is increasing in the bonus payment B (a standard result) and decreasing in the bonus threshold \hat{y} (as a less attainable threshold reduces the expected marginal return to effort).

from insurance premia, and will most likely not be required to make any insurance payments in the short term. Indeed, AIG emphasized in multiple annual reports that it never made any losses in these transactions:

Furthermore, based on portfolio credit losses experienced to date under all outstanding transactions, no transaction has experienced credit losses in an amount that has made the likelihood of AIGFP having to make a payment, in AIGFP's view, to be greater than remote, even in severe recessionary market scenarios. (AIG, 2002, p. 56.)

Three years later, AIG similarly disclosed:

AIGFP has never had a payment obligation under these credit derivatives transactions where AIGFP is providing credit protection on the super senior risk. (AIG, 2005, p. 128.)

AIG's regulator (the Office of Thrift Supervision) took the absence of losses observed over 14 years as a persuasive sign that AIG-FP's business model was safe. Indeed, in July 2007 the regulator declared that the level of credit risk inherent in AIG-FP's operations was moderate (see Office of Thrift Supervision, 2007).³⁴ One of three stated reasons was that: "AIG-FP has never incurred a credit loss in its derivatives portfolio and has experienced only one major credit loss on its asset portfolio (in 1993)." The simple model above suggests that the opposite was in fact the case. Large, apparently safe, and steady returns were a key warning sign that a non-trivial amount of weight was being placed on a potentially catastrophic outcome.

A similar strategy (i.e. seeking apparently stable income streams by means of a small probability of catastrophic events) was at the heart of the failure of several large financial conglomerates during the crisis. Dexia's sovereign bond portfolio (see Kelion, 2011), Citibank, Bear Stearns, and Lehman's top-rated portfolios of mortgaged-backed securities (see Financial Crisis Inquiry Commission, 2011), and Anglo-Irish mortgage portfolios (see Quinn, 2014), among others, were all apparently low-risk positions (with extremely high leverage) that would have paid off in all states of the world except for the rare event of a simultaneous drop in various asset prices – e.g. in the U.S. national housing markets, as

³⁴For a general overview of the relation between AIG and the regulators, see Financial Crisis Inquiry Commission (2011).

opposed to idiosyncratic failures in a handful of states alone. A review of the compensation structures in place at Bear Stearns and Lehman Brothers (Bebchuck et al., 2010) links them to such failures by concluding that “performance-based compensation off the table based on short-term results did provide them with undesirable incentives – incentives to seek improvements in short-term results even at the cost of an excessive elevation of the risk of large losses at some (uncertain) point in the future.”

For a non-financial example of this problem, consider the 2005 explosion at BP’s Texas City refinery. With 15 fatalities, it was the most serious (and deadliest) industrial accident in 15 years. This accident originated from a deep-seated organizational malfunction that plagued BP, causing a string of record-breaking accidents and fines between 2005 and 2010.³⁵ The Baker Report (Baker, 2007, pp. 90-91) concluded that the short-term focus of managerial incentives was a key contributor to a lack of investment in process safety:

The performance system has a decidedly short term emphasis, with performance contracts typically focused on short term goals [...] A decision to reduce spending on inspections, testing, or maintenance may have no apparent negative impact on process safety performance for a lengthy period. By the same token, increasing spending on inspections, testing, or maintenance may not lead to an ascertainable improvement in process safety performance in the short-term [...] [Long-term] concepts such as process safety performance and human capabilities appear to be less well tracked, understood, and managed by BP’s systems.

In such environment, managers perceive long-term investments as decisions that are unlikely to enhance their own performance metrics, and consequently are not in their interest. In fact, since managers do not typically spend a long period of time on a given job (e.g. less than two years on average at BP’s refineries) there is a low chance that an appropriate investment in safety will be beneficial to them.

Illustration of solutions

It is critical that firms understand sources of “easy” profits, as such profits may be hiding a small chance of a catastrophic event. Successful organizations may limit short-termism by deploying a wide range of organizational practices.

³⁵This string of accidents includes, among others, the largest oil spill ever in the Alaskan north slope in 2006 (see Barringer, 2006) and the largest ocean-based spill in American history resulting from the Deepwater Horizon platform explosion in the Gulf in 2010 (see Robertson, 2010). For a more complete list of accidents over this period see New York Times (2010).

First, agents in charge of risky decisions can be offered compensation contracts that limit their temptation to gamble in the first place, for instance through the use of pay clawbacks whereby agents must return bonus payments in the event of subsequent losses, share grants with long vesting periods, and contracts involving a limited share of variable pay. In finance, eliminating catastrophic risk is in the interest of the public, the ultimate debt holder (given the existence of public deposit guarantees). Indeed, in the aftermath of the 2007-08 financial crisis, dealing with short-termism has been a central concern for regulators. For example, the European Union (Capital Requirements Directive IV) limits variable pay in this sector to 100% of fixed compensation (base salary plus benefits), which may increase to 200% with shareholder approval. A further 50% is allowed in the form of deferred compensation, subject to a five year minimum deferral.

Secondly, the formal structure of the organization can be adapted by introducing an independent risk management function (e.g. Kashyap et al., 2008) to limit the degree of risk-shifting. A common solution is the use of a Chief Risk Officer (CRO) with sufficient seniority to overrule managers' risk decisions.³⁶ The existence of risk control techniques has been found to be effective at reducing risk-taking in the run up to the crisis – indeed, Ellul and Yerramilli (2013) find that banks with stronger risk management functions had “lower exposure to private-label mortgage-backed securities, were less active in trading off-balance sheet derivatives, had a smaller fraction of non-performing loans, and had lower downside risk during the crisis years.” Best practice in this area, as recommended by regulators, involves those in charge of monitoring, such as risk officers or safety officers, directly reporting to the board (rather than the CEO).³⁷

³⁶As the Committee of European Banking Supervisors (2010) has put it: “The CRO (or equivalent) should have sufficient independence and seniority to enable him or her to challenge (and potentially veto) the decision-making process of the institution.”

³⁷The latest recommendations from the Bank for International Settlements indicate that “the CRO should report and have direct access to the board or its risk committee without impediment. The CRO should have the ability to engage with the board and with senior management on key risk issues. Interaction between the CRO and the board and/or risk committee should occur regularly, and the CRO should have the ability to meet with the board or risk committee without executive directors being present.” (See Basel Committee on Banking Supervision, 2014.) In the U.S., the Office of the Comptroller of the Currency (2014) current guidelines say: “The Board or its risk committee approves all decisions regarding the appointment or removal of the CRE [Chief Risk Executive] and approves the annual compensation and salary adjustment of the CRE. The Board or the Board’s risk committee receives communications from the CRE on the results of independent risk management’s risk assessments and activities, and other matters that the CRE determines are necessary.”

4 Communication failures

In the previous sections, we studied how incentive misalignments lead agents to make sub-optimal choices along their various output dimensions by biasing their choices towards the short term and towards individualistic (rather than collaborative) actions. Incentive misalignments may also lead to communication failures between agents. We study such failures next.

In particular, we consider two instances of communication failures. First, failures when the information being transmitted is soft (i.e. agents' messages are not verifiable by outsiders), in which case information is manipulated in an attempt to influence decision-makers – as studied in the well-known literature on strategic information transmission following Crawford and Sobel (1982). Second, failures when information is hard, in which case communication is distorted due to agents protecting themselves against legal or reputational consequences of being informed (i.e. to “cover their ass”).³⁸

To illustrate the distinction between soft and hard information, consider the case of bank loans. Examples of hard information include accounting measures of the borrower such as audited revenues, costs, taxes, and leverage. These measures are externally verifiable by auditors, regulators, and investors. Examples of soft information include the subjective knowledge that a bank manager has of the character and talent of specific executives and of a borrower's investments. Banks rely on both types of information when offering loans. Indeed, Berger et al. (2005) and Liberti and Mian (2009) show that different types of banks, and different hierarchical layers within them, rely differently on these two types of information.³⁹

4.1 Soft information and cheap talk

In cheap talk models, messages have no direct impact on payoffs (see the seminal model of Crawford and Sobel, 1982, and see Sobel, 2012, for a comprehensive review).⁴⁰ Senders of

³⁸Our focus on internal aspects of organizations excludes the extensive literature on information transmission in market settings, including work on buyer-seller interactions and on expert services in markets for credence goods (such as doctor-patient relationships). For reviews of this literature, see for example Milgrom (2008) and Dulleck and Kerschbamer (2006, in this journal).

³⁹Berger et al. (2005) show that larger banks rely more on hard information, while smaller banks rely more on soft information (consistent with the theory in Section 2 showing how decentralization allows for the best use of local knowledge). Similarly, Liberti and Mian (2009) show that loans that travel higher up a bank's hierarchy are approved on the basis of hard information, while those that are approved at lower levels rely more on soft information.

⁴⁰See also Gibbons et al. (2013) for a survey of the vast literature on strategic information transmission inside organizations (and, more broadly, in the terminology of Milgrom and Roberts, 1988, on influence

information seek to influence the receivers of this information by distorting their messages. Receivers, however, anticipate this fact. The general result is that incentive conflicts lead to noisy communication: messages sent in equilibrium are coarse (i.e. imperfectly informative).

For example, supervisors forced to provide subjective evaluations of their subordinates (a form of cheap talk) tend to compress these evaluations, in an attempt to have a team of satisfied subordinates, by bunching them at the highest end of the available range. In an empirical study, Moers (2005) finds that “increased discretion [of the evaluator] is related to compression of performance ratings and more lenient performance ratings.” Similarly, internal ratings by bank credit officers of their clients are more upward-biased (and have lower predictive power) when the relationship between them is ongoing relative to when the officers are about to transfer these clients to other credit officers (Hertzberg et al., 2010).

Cheap talk communication has been widely used as a building block in organizational economics. Dessein (2002) compares the value of delegating decisions to a privately informed agent versus engaging in cheap talk communication with him while retaining decision rights.⁴¹ Relatedly, Prendergast (1993) studies a yes-man phenomenon whereby an agent does not send messages contradicting the prior beliefs of his manager in order to prevent the manager from (incorrectly) inferring that the agent does not understand the problem at hand.⁴²

We now present a simple variation of Crawford and Sobel’s (1982) model. In this simple model, an informed but biased subordinate decides how much information to share with his boss. The boss, in turn, must decide whether or not to interrupt a project before maturity on the basis of the information she receives – a common problem faced by organizations and one that is relevant for the cases below. We assume that the subordinate’s information is soft and messages are free. As a result, communication is possible only to the extent that

activities). Gibbons et al. present a unifying framework in which an informed ‘sender’ selects cheap messages and/or costly actions with the purpose of influencing the beliefs and decisions of a ‘receiver’. Their framework captures a number of important special cases, including those involving soft and hard information. As noted by Gibbons et al., these models to some extent formalize various early insights in Cyert and March (1963).

⁴¹Alonso et al. (2008) and Rantakari (2008, 2013) build on this work by showing that larger synergies between divisions create an incentive for agents to better communicate with each other. Relatedly, Dessein et al. (2010) and Friebel and Raith (2010) investigate how the allocation of authority and the design of other organizational variables affect the interaction between coordination and the utilization of local information.

⁴²A related literature studies costly messages. For instance, in career concerns models (e.g. Holmstrom, 1982, Holmstrom and Ricart-i-Costa, 1986) agents manipulate the beliefs of others about their talent by taking costly actions (such as inefficiently high effort levels) that interfere with their bosses’ inference process, a behavior known as ‘signal jamming’. Prendergast and Stole (1996) show that rational agents who want to acquire a reputation for being fast learners become conservative and unwilling to react to new information over time. Other instances of career concerns involve agents broadly engaging in value-reducing activities to appear more skilled (e.g. Prat, 2005, and Hermalin and Weisbach, 2012).

the objectives of the subordinate and the boss are sufficiently aligned.⁴³

Model 3. A simple model of cheap talk

A boss is in charge of a project with a binary outcome (success or failure). Suppose initially that the boss acts in isolation. She can either allow the project to reach maturity, in which case she obtains a payoff $B > 0$ if the project succeeds and a payoff of zero if the project fails, or interrupt the project and obtain a payoff $b \in (0, B)$. The boss initially believes the project will succeed with probability p_0 . Suppose $p_0 B > b$, and so absent further information the boss prefers the project to reach maturity. We refer to the ratio $\frac{B}{b}$ as the power of the boss's incentives.

Now suppose that before making her decision, the boss requests a recommendation from a subordinate to either “continue” or “interrupt” the project. This subordinate is better informed than the boss concerning the likelihood that the project succeeds, but also has a stronger incentive to let the project reach maturity. Specifically, the subordinate learns one of three signals regarding the state of the project: (1) “good news,” which occurs with probability q_H and indicates that the project has a high probability of success $p_H \in (p_0, 1]$; (2) “bad news,” which occurs with probability q_L and indicates that the project has a low probability of success $p_L \in (0, p_0)$; or (3) “terrible news,” which occurs with the remaining probability $1 - q_H - q_L$ and indicates that the project has zero probability of success. (By construction, $p_0 = q_H p_H + q_L p_L$.) If the project reaches maturity the subordinate receives a payoff $B' > 0$ upon success and a payoff of zero upon failure, and if the project is interrupted the subordinate receives a payoff $b' \in (0, B')$.

In what follows we assume that, in the event of bad news, the boss prefers to interrupt the project (i.e. $\frac{B}{b} < \frac{1}{p_L}$). We also assume $\frac{B'}{b'} \geq \frac{B}{b}$, which means that the subordinate is biased, relative to the boss, toward letting the project reach maturity. We say that the subordinate's bias is large if, in the event of bad news, he prefers to continue the project (i.e. $\frac{B'}{b'} > \frac{1}{p_L}$) and we say that the subordinate's bias is small otherwise (i.e. $\frac{B'}{b'} \leq \frac{1}{p_L}$). Note that, in either case, the two players' incentives are aligned in the good and terrible states.

In this model, we assume that the subordinate's information is soft and his recommendation is merely a “cheap talk” message: the subordinate is free to make any recommendation regardless of the signal he receives and the recommendation itself does not affect the players'

⁴³The present model differs from Crawford and Sobel (1982) in that the boss (or receiver) faces a simple binary decision (i.e. proceed or not with a project) rather than a continuous one (i.e. select a real number in an attempt to best match a continuous state of the world).

payoffs (i.e. the players are affected only by the ultimate fate of the project). After receiving a recommendation, the boss is also free to select any course of action she desires. Ideally, the boss would like to receive a recommendation to continue if and only if the subordinate has good news. From the boss’s standpoint, receiving such recommendation is equivalent to having all information that the subordinate has.

The following result describes the most preferred equilibrium from the boss’s standpoint:⁴⁴

Result 3. *In the cheap talk model, the most desirable equilibrium from the boss’s standpoint is as follows:*

1. *If the subordinate’s bias is small (i.e. $\frac{B'}{b'} \leq \frac{1}{p_L}$), perfect communication is possible: the agent recommends “continue” if and only if he has good news, and the boss follows this unbiased recommendation.*
2. *If the subordinate’s bias is large (i.e. $\frac{B'}{b'} > \frac{1}{p_L}$), only partial communication is possible: the agent recommends “interrupt” if and only if he has terrible news, and the boss follows this biased recommendation. In this case, while the boss optimally interrupts the project when news is terrible, she suboptimally continues the project when news is bad.*

Proof. Part 1. The outcome of the hypothesized equilibrium (i.e. continue with the project if and only if the subordinate has good news) is weakly preferred by the subordinate over every other possible outcome and is strictly preferred by the boss over every other possible outcome. It follows that the prescribed strategies constitute an equilibrium and that such equilibrium is the boss’s most desirable one.

Part 2. The outcome of the hypothesized equilibrium (i.e. interrupt the project if and only if the subordinate has terrible news) is strictly preferred by the subordinate over every other possible outcome, which implies that the subordinate cannot profit from a deviation. Moreover, note that the boss strictly prefers to interrupt the project when the subordinate

⁴⁴An equilibrium of this “cheap talk” game is a weak perfect Bayesian equilibrium of the two-stage game: the subordinate first selects a recommendation as a function of his signal (while correctly anticipating the boss’s optimal reaction to this recommendation) and the boss then selects an optimal course of action as a function of the subordinate’s recommendation (by applying Bayes’ rule, when possible, to assess the subordinate’s underlying information). This game allows for multiple equilibria. For instance, there always exists a “babbling” (or uninformative) equilibrium, in which the subordinate selects a recommendation at random, independent of his information, and the boss lets the project reach maturity regardless of the subordinate’s recommendation.

has terrible news and strictly prefers to continue the project when she knows the subordinate has either good or bad news, but not terrible news (which follows from the assumption that the boss would prefer to continue the project even when she fully ignored the subordinate's information). As a result, the boss cannot profit from a deviation either. Finally, that the proposed equilibrium is the boss's preferred equilibrium follows from the fact that there is no equilibrium in which the boss takes different actions when the subordinate has good and bad news – since the subordinate's incentives are identical in both cases – and the proposed equilibrium delivers the boss's most preferred outcome subject to this restriction. ■

Result 3 tells us that when the two player's incentives are sufficiently aligned, perfect communication is possible in equilibrium despite information being soft. In contrast, when the subordinate is sufficiently eager to proceed with the project, only partial communication is possible: by pooling good and bad states of the world, the subordinate manages to influence the boss's decision to his advantage.⁴⁵

Cheap talk: some cases

Communication distortions due to incentive conflicts are endemic in organizations, where they generate and magnify failures. Consider, for example, the JPMorgan scandal involving the activities of Bruno Iksil, a trader who worked within the Chief Investment Office of the Bank and who came to be known as the “London whale.” The scandal came about when the trader (the sender in our model) took enormous directional bets on the market and lost.⁴⁶ Immense losses were only possible because top management was effectively kept in the dark about the extent of the losses, first by the trader but then also by his immediate superiors, therefore allowing the trader to continue his strategy for longer in a gamble for resurrection. Iksil and his direct boss, for instance, intentionally obscured their losses for months by recording the value of the trades at the most favorable prices possible within a given day (see Levin and McCain, 2013, pp. 110-152).

The traders also sought to alter accounting categories to suit their purposes. Specifically, they produced a “decision table” (see Levin and McCain, 2013, p.70), that muddled the

⁴⁵That information is soft is crucial for this result. If the subordinate's information was instead hard, the subordinate would end up sharing his information in all states regardless of the size of his bias, as shown by Grossman (1981) and Milgrom (1981).

⁴⁶While the accumulation of risk was not in the job description of the trader, there seems to be little doubt that management at JPMorgan knew that the Chief Investment Office was engaging in proprietary trading (as opposed to mere hedging) activities, and was happy to turn a blind eye while it was generating outsized returns (see e.g. Schatzker et al., 2012).

value of the investments. The table proposed to change the way risk was measured in order to reduce the apparent RWA (risk weighted assets) by half and thus allowing them to follow an “Opportunistic risk reduction” strategy (that, for the most part, allowed the current investments to be maintained), as opposed to an “Unwind of existing trades across the board” alternative.⁴⁷

Illustration of solutions

Truthful communication of soft information requires incentive alignment. Organizations can improve such alignment in two general ways: through extrinsic motivation, for instance using compensation and careers to shape incentives; or through intrinsic motivation, for instance by selecting individuals who directly care about the organization’s objectives.

Siebel Systems, which created and dominated the market for “customer relationship management” software between its founding in 1993 and its acquisition by Oracle in 2006, illustrates a successful use of extrinsic motivation. This type of software requires extensive customization which, in turn, requires horizontal communication between engineers and salesmen. The usual conflict in the design of business software is that salesmen are biased towards extensive customization (to maximize sales) while engineers are biased towards standardization. Thus, in terms of communication, engineers tend to exaggerate the cost of customizing software, and salesmen tend to exaggerate its value. At Siebel, such misalignments were mitigated by centering monetary incentives and promotions of both salesmen and engineers on measures of customer satisfaction, which naturally aligned the incentives of both groups (Simons and Davila, 2002).

Pixar Animation, the pioneering film studio, illustrates a successful use of intrinsic motivation. Pixar employees’ openness to internal criticism and feedback has been considered crucial for the studio’s competitive advantage. For example, in its “dailies,” work in progress receives early feedback (earlier than in other companies) thereby reducing wasted effort. This feedback is famously truthful. Founder and CEO Ed Catmull (2008) summarizes his approach as follows: “You get great creative people, you bet big on them, you give them enormous leeway and support, and you provide them with an environment where they can get honest feedback from anyone.” The key to the openness of Pixar employees is that they care directly about their product and about interacting with, and learning from, senior artists they admire.

⁴⁷Note that much of the initially (de facto) soft information become hard in the course of the inquiries into the losses, thereby allowing us to write this account.

4.2 Hard information and CYA

In the previous section, miscommunication was due to a lack of incentive alignment between an informed subordinate and his uninformed boss. Yet there are instances where communication failures occur despite the incentives of these two parties being aligned. The reason is that, in the presence of incentive misalignments between the boss and third parties, such as the boss’s clients or superiors, the boss may not want to hear (potentially compromising) bad news from her subordinate. Notably, the resulting failures may involve information that is in principle hard/verifiable, such as the occurrence of a safety incident, as opposed to mere cheap talk by subordinates.

Consider, for example, communications regarding the “enhanced interrogation” (i.e. torture) techniques used by the counterterrorism program in the U.S. post 9-11. The White House Counsel is quoted as saying to U.S. President George W. Bush in 2002 (Eichenwald, 2012, p. 283): “Mr. President, I think for your own protection you don’t need to know the details of what’s going on here.”

In light of the seminal work of Grossman (1981) and Milgrom (1981), a failure of information transmission in a context of hard information might be surprising. In the models of Grossman and Milgrom (and more generally, in models on disclosure of hard information), agents may choose to conceal information, but if they decide to share, they cannot at the same time distort their information. Broadly speaking, the result is full information revelation, despite incentive misalignments, owing to an unraveling process: agents with the best signals wish to disclose them, and agents with progressively worse signals then follow.

We now present a simple model that provides a rationale for communication failures even when information is hard and incentives between subordinates and bosses are fully aligned. This model is identical to the one considered in the previous subsection except for three differences: (1) the subordinate’s information is hard; (2) information that is shared with the boss might be subsequently used against her; and (3) the two agents’ incentives are fully aligned. As we shall see, when combined with high-powered incentives for the boss, these features hinder communication. To the best of our knowledge, such source of miscommunication has not yet been modeled in the literature.⁴⁸

Model 4: Miscommunication due to CYA

⁴⁸The most related analysis is that of Dewatripont and Tirole (2005), where communication requires effort from both sender and receiver and the equilibrium effort devoted to such communication is higher when incentives are more aligned: the boss pays more attention to her subordinate if the information in question is likely to further the boss’s interests.

We begin with the same setting as in Model 3. Namely, a boss must decide whether to continue or to interrupt an ongoing project and a subordinate is informed about the state of this project. As before, there are three states: “good news,” “bad news,” and “terrible news” (which occur, respectively, with probabilities q_H , q_L , and $1 - q_H - q_L$). Recall that p_H and p_L denote the probabilities of success contingent on good and bad news, respectively, and p_0 denotes the unconditional probability of success. We now assume, however, that the subordinate’s information is hard – i.e. it can be withheld, but not distorted, and it is verifiable by third parties. We also assume that the boss and the subordinate have aligned incentives.

Before the boss makes her decision, she may or may not request information from the subordinate. We assume that this request is itself verifiable by third parties.

If the boss does not request information, both the boss and the third parties remain uninformed (for instance, we may assume that the subordinate either does not collect the information in the first place or simply does not summarize it in a way that is readily observable by others). Consequently, given the assumption that $p_0B > b$, the boss continues with the project, receiving a payoff $B > 0$ upon success and a payoff of zero upon failure.

If the boss does request information, both the boss and the third parties learn the state of the project perfectly.⁴⁹ The boss can then interrupt the project and obtain a sure payoff $b \in (0, B)$ or continue with the project and obtain either: (1) a payoff B if the project succeeds; (2) a payoff of zero if the project fails and she had received good news; or (3) a payoff of $-C$ if the project fails and she had not received good news, where $C > 0$ represents a penalty imposed by third parties (e.g. shareholders or the courts) on the boss for proceeding despite explicitly requesting information and failing to receive good news. The benefit of requesting information is that the boss can make a more informed decision, including interrupting the project when it is certain to fail.

Suppose the efficient decision for the organization as a whole is to continue with the project *only* when the subordinate has good news. Suppose, moreover, that the penalty C is large enough that, provided the boss indeed requests information, she finds it optimal to continue with the project only if she receives good news (namely, $p_L B - (1 - p_L) C < b$).

We now ask whether or not the boss wishes to request information in the first place.

⁴⁹Given the incentive structure of the model, the subordinate cannot help the boss by intentionally withholding information after it has been requested.

Given the incentive structure, she strictly prefers *not* to become informed if and only if

$$\underbrace{p_0 B}_{\text{Project continued}} > \underbrace{q_H p_H B}_{\text{Project continued}} + \underbrace{(1 - q_H)b}_{\text{Project interrupted}}, \quad (5)$$

where the L.H.S. of this inequality is the boss's expected payoff when acting uninformed and the R.H.S. is the boss's expected payoff when acting informed.

Result 4. *In the CYA model, the boss prefers not to request information, despite losing her option value to interrupt the project, if and only if her incentives are sufficiently high-powered (namely, the ratio $\frac{B}{b}$ is sufficiently large). The resulting organizational failure is that the boss continues with the project even when the subordinate lacks good news.*⁵⁰

Proof. For the first part of the result, note that inequality (5) is equivalent to $(q_H p_H + q_L p_L) B > q_H p_H B + (1 - q_H)b$. Upon rearranging terms, this inequality becomes $\frac{B}{b} > \frac{(1 - q_H)}{q_L p_L}$, which holds *iff* $\frac{B}{b}$ is sufficiently large. ■

The model highlights the interaction between the incentives of the boss and her willingness to receive information from her subordinates (or from her peers, for that matter). The higher the power of the boss's incentives, the less she will want to hear information that potentially conflicts with her primary goal. Note, however, that even a boss with high-powered incentives wishes to be informed when there is a sufficiently large chance that the project has *zero* probability of success – in this case, the option value of interrupting the project is large enough to overturn the effect of the boss's high-powered incentives.

The key assumption behind the CYA mechanism is that third parties are capable of punishing the boss (when news is not good) *if and only if* the boss decides to become informed. (Indeed, the boss can avoid all external punishments by remaining ignorant: “I didn't know!”) If instead the boss's decision to become informed was orthogonal to the information available to third parties (together with their ability to punish the boss), either because third parties had unfettered access to all of the subordinate's information, or because they had zero access to it, the boss would trivially prefer to be fully informed. This observation plays a crucial role in solving the CYA problem, as we discuss in the applications below.

CYA: some cases

⁵⁰In contrast, for any given incentive ratio $\frac{B}{b}$, the boss prefers to be informed, owing to a large option value of interrupting the project, whenever the probability of terrible news $(1 - q_H - q_L)$ is sufficiently large (in which case inequality (5) fails).

Consider again the BP Texas City refinery case we introduced in Section 2. An important contributor to the failure appears to be a lack of information transmission between refineries, and between workers and supervisors, about safety problems. As the Baker Report explains (Baker, 2007, p. 79): “many workers, particularly at Texas City, Toledo, and Whiting, believe that some incidents, near misses, or other safety concerns do not get reported for a variety of reasons, including fear of being blamed or retaliated against.” Concerning a previous accident at BP, the Baker Report concluded that “cost pressures inhibited staff from asking the right questions; eventually staff stopped asking” (p. 91). Moreover, “interviewees commented that people who raise these issues were sometimes branded as trouble makers and given less attractive work” and “when asked about the incident investigation processes, many [interviewees] view it to be more punitive in nature, a process that does not look to the root cause of an incident” (pp. 75-76).

A key to understanding the problem is to note, as Roberts (2004) points out, that CEO John Browne had reorganized BP to empower managers, while also making them accountable for performance and granting them high-powered incentives. The model illustrates how high-powered incentives may undermine a manager’s incentives to seek valuable, but potentially compromising, information. Note that in this case both the intertemporal multitasking and CYA mechanisms appear to complement one another; namely, high-powered incentives led managers to engage in short-term oriented projects, whereas the CYA mechanism led managers to continue with these projects despite the existence of red flags elsewhere in the organization.

CYA behavior was also a notorious aspect of the intelligence debacle surrounding the (non-existent) Weapons of Mass Destruction in Iraq. Referring to an appearance of Vice President Richard Cheney in Meet the Press, an intelligence analyst working on the Counterterrorism team wrote, in 2013 (see Bakos, 2013): “Except instead of asking us questions behind closed doors, Cheney was asserting to the public as fact something that we found to be anything but. I found myself yelling at the TV like I was contesting a ref’s blown call in a football game.” Commenting on his 2004 resignation, the analyst noted: “I was exhausted answering historical questions trying to justify the invasion.”

Illustration of solutions

Underlying the CYA failure is the fact that the ability of third parties (e.g. shareholders, the board, or the courts) to punish the boss is directly linked to the boss’s decision to become

informed. As the theory points out, such link can be broken, perhaps paradoxically, in two opposite directions: by making the organization more transparent (thus making sure third parties are always informed and capable of punishing the boss, regardless of the boss's own knowledge level) or by making it less so (thus protecting the boss from the consequences of becoming informed).

On the one hand, decision making can become more transparent by committing up front to share all relevant information with third parties. One way to do so is by using monitoring agents who report outside the line of business. An example is the growing use of a Chief Risk Officer (CRO) who reports not to the CEO but to the board, as discussed in Section 3.⁵¹

On the other hand, decision making can become less transparent by committing to secrecy, therefore allowing the boss to receive candid advice from a range of sources. This approach is in the spirit of Prat's (2005) analysis of career concerns, where transparency of agents' actions may be undesirable since it may lead to conformism.⁵² An example of an institution that aims to reduce transparency is the executive privilege (see Rozell, 2002), introduced during the U.S. Presidency of Dwight Eisenhower, whereby the internal communications of the executive branch of the U.S. are protected from external scrutiny for this very reason.⁵³

5 Inability to adapt to change due to organizational rigidities

Existing businesses often fail to innovate and are driven to extinction by technological evolution. Famous examples include Kodak and Polaroid in photography (driven out by the transition to digital photography), Motorola in cellular phones (destroyed by the transition to smart phones), and Digital Equipment Corporation in main frames (with the arrival of PCs).

Such dramatic technological changes, however, need not lead to the death of incumbents.

⁵¹A survey by Accenture (2013) of 446 large organizations, including almost 50% of large financial service companies, found that the use of CROs had increased from 78% of companies in 2011 to 96% in 2013.

⁵²Closely related to this resolution is Crémer's (1995) finding that lack of transparency can make punishments more credible, as it prevents the principal from learning states in which punishing the agent is not ex-post credible (like the parent who tells the child upfront: "If you don't do your duty, I don't want to hear any excuses").

⁵³We are grateful to an anonymous referee for suggesting this remedy.

Some companies do manage to smoothly cope with this kind of radical transitions. IBM transformed itself into a service company and spun off most of its hardware business; Intel transitioned from the memory business to producing microchips for personal computers; Apple, despite flirting with death, has managed to reinvent itself in the first decade of the millennium, becoming a mobile computing powerhouse.

There are several factors that limit organizational transitions. Some of them fall outside the scope of our survey. In particular, an old incumbent's absence from a newly created industry may be efficient. For instance, whereas entrants only have potential gains from a new product introduction, the incumbent worries about cannibalization of its existing profits and thus postpones introducing innovations. Moreover, the incumbent typically has sunk investments in the old technology and thus may optimally choose to ride its technology all the way to the end, even knowing that it may eventually disappear. Finally, there are many different paths technology may take. There are thousands of potential innovators and many potential innovations – the fact that the company which manages to hit upon the next big thing is an entrant may not be statistically surprising.

Nonetheless, both the cases and the literature, including some systematic empirical evidence, suggest that *organizational factors* may also be crucial in the way businesses react to innovation. For instance, in a study aiming to distinguish pure industrial-organization theories of innovation failure (in which incumbents optimally choose not to invest) from organizational theories, Henderson (1993) shows that incumbent firms were indeed less effective at making investments that would make their existing capabilities obsolete even when such investments were necessary.

In what follows, we focus on two organizational factors that we believe act as critical barriers to change:

First, even when an incumbent has a valuable new idea, it may be difficult to push it through the organization when agents have already made investments that are specific to the old technology (see Section 5.1). Akin to a political process that blocks welfare-improving reforms, coalitions of agents may block profit-maximizing innovations that hurt them – in a world with incomplete contracts, compensating money transfers may be impossible to implement.

Second, even in the absence of blocking coalitions and other political factors, an organization may be stuck on its old ways because its employees may have settled on a particular equilibrium of a repeated game, and may lack the ability to move to a better equilibrium

(see Section 5.2). Indeed, the actions taken in an organization are often governed by non-written relational contracts, which, as we shall show, are hard to change. For instance, a proposed change in behavior may be viewed as an efficient adaptation by one party, but as mere opportunistic behavior by another.

While we have discussed the above rigidities in terms of resistance to technology adoption, the same mechanisms may be implicated in firms' rigidities to adopt efficient organizational changes following a change in the environment, as in some of the cases we discuss below.

5.1 Vested interests in the status quo

If change is beneficial for the firm, how come blocking players cannot be compensated and thus persuaded to support the new order? A large economics literature has argued that contractual incompleteness is pervasive and, in the face of such incompleteness, power (the allocation of residual control rights) affects incentives for both ex-ante investments and ex-post adaptation (e.g. Grossman and Hart, 1986, Hart and Moore, 1990, Aghion and Tirole, 1997, Williamson, 1975, and Jensen and Meckling, 1976). Specifically, agents may use their power to block efforts to change – a fact that is particularly relevant when technological innovation makes particular coalitions obsolete.

This notion was first explored in the political economy literature (e.g. Krusell and Rios-Rull, 1996, and Acemoglu and Robinson, 2000) as an explanation for economy-wide failures to adopt new technologies. Krusell and Rios-Rull argue that the adoption of new technologies grants rents to early adopters, and with these rents comes political power. As a result, initial adopters develop a vested interest in conserving the status quo and attempt to block new competing technologies down the road. The result is a cyclical equilibrium with short periods of rapid adoption and growth followed by long periods of stagnation. Acemoglu and Robinson argue that in order to understand the blocking of new technologies by a country's elite one must distinguish between the elite being an economic loser (namely, losing the rents generated under the old technology) and the elite being a political loser (namely, losing the ability to appropriate, via taxation, the higher rents created under the new technology). Only when a country's elite stands to lose in both the economic and political dimensions will it attempt to block adoption.⁵⁴

⁵⁴Also related is the work of Grossman and Helpman (1994), who study equilibrium trade policies resulting from rent seeking by interest groups. Analogous to the ex-post inefficiencies described above, they find that vested interests lead to a persistence of surplus-reducing policies.

In the organizational context, Schaefer (1998) and Dow and Perotti (2010) study conditions under which technological innovations may lead established firms to fail as a result of changes in the distribution of power, and with it in the distribution of rents, caused by the innovations. These redistributions of power have the potential to create winners and losers, and the latter may successfully oppose change.

Dow and Perotti (2010) also show that successful firms may be especially prone to failures following large (disruptive) technological changes. Next, we present a simplified version of their model that captures key features of the failures we discuss below.⁵⁵ The two main ingredients of the model are: (1) a firm’s inability to commit to distribute rents independently of the firm’s power structure, which in turn hinders ex-post bargaining; and (2) a level of goodwill that grants successful firms a degree of slack that can be exploited by losers.⁵⁶

Model 5. Change with vested interests

Baseline model. Two agents work at an established firm: agent 1 (the “winner”) and agent 2 (the “loser”). Initially, the firm produces output V , which is divided equally among the agents. Additionally, the firm enjoys a level of goodwill $G < V$. The role of G is described momentarily.

Now suppose there is a technological change that, if adopted, potentially allows agents to jointly produce μV , where $\mu \in (1, 2)$. It is agent 1 who decides whether or not this change is adopted. If it is not adopted, the firm continues producing V and dividing it equally. If the change is adopted, agent 2 must decide whether or not to cooperate. If agent 2 cooperates, the firm produces its potential output μV , which is divided according to unequal fractions $\frac{1}{2}\mu$ and $1 - \frac{1}{2}\mu$ that favor the winner in proportion to the size of the innovation (i.e. successful adoption raises the power of agent 1 and, as a result, the fraction of rents he obtains). If agent 2 does not cooperate the firm is disrupted and produces output G , which is divided equally. As a result, agent 2 decides to be disruptive, and therefore agent 1 does not adopt

⁵⁵The key simplifying feature of our version of Dow and Perotti’s model is that the blocking activities of “losers” are binary (all or nothing), rather than continuous.

⁵⁶A complementary explanation of adaptation failures is that of Hart and Moore (2008) and Hart and Holmstrom (2010). Hart and Moore argue that contracts endow parties with self-serving reference points, and with them a sense of entitlement. This entitlement, in turn, damages ex-post bargaining and leads to performance shading whenever a party feels aggrieved. An imperfect remedy is to write rigid long-term contracts that limit the negative impact of self-serving views, but have the drawback of restricting a firm’s ability to cope with change. Hart and Holmstrom argue that the same sense of entitlement interferes with coordination between firms whenever such coordination creates winners and losers. An imperfect remedy is firm integration.

the new technology, if and only if

$$\frac{1}{2}G > \left(1 - \frac{1}{2}\mu\right)\mu V. \quad (6)$$

Result 5(a). *In the model of vested interests, agent 1 adopts the new technology only if either goodwill G is sufficiently small or the innovation μ is sufficiently small, or a combination of the two. Consequently, firms with strong goodwill do not adopt radical technological changes.*

Proof. Inequality (6) holds if and only if $G > (2\mu - \mu^2)V$. The desired result follows from noting that the L.H.S. of this inequality is increasing in G and the R.H.S. is decreasing in μ (since $\mu \in (1, 2)$). ■

This result tells us that an organization that is already sufficiently successful will find it difficult to profit from innovation: those agents whose skills are not complementary to a new technology prefer to block change and thus retain their ability to extract rents.

Entry of new firms. Suppose agent 1 now has an additional option: opening a new firm that uses the new technology and hires both agents. This firm costs $C \in (0, V)$ to create and is identical to the established firm, except for the fact that it has zero goodwill. Accordingly, in the new firm, agent 2 is never disruptive and the firm produces value $\mu V - C$ to be divided according to unequal shares $\frac{1}{2}\mu$ and $1 - \frac{1}{2}\mu$, as before.

Result 5(b). *In the model of vested interests, agent 1 opens a new firm (and so the established firm fails) whenever both the goodwill of the established firm G and the innovation μ are sufficiently large. In other words, the established firm fails, leading to a deadweight loss of C , whenever its goodwill is high and it faces a large technological change.⁵⁷ (See Figure 3 for a schematic representation of this result.)*

Proof. Fix V and C . Whenever μ and G are sufficiently large we have

$$G > (2\mu - \mu^2)V \text{ and } \frac{1}{2}\mu(\mu V - C) > \frac{1}{2}V.$$

The first inequality, which is equivalent to (6), indicates that agent 2 would disrupt the technological adoption at the established firm. The second inequality indicates that agent 1 prefers to open a new firm using the new technology over staying at the established firm under the old technology. ■

⁵⁷Moreover, if the size of the innovation μ is sufficiently close to its upper bound 2, the established firm fails even when its goodwill is small (but positive).

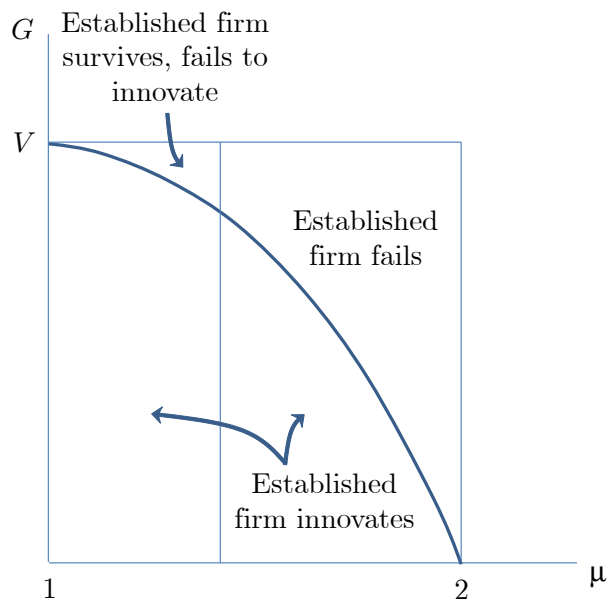


Figure 3: Vested interests and innovation

This result tells us that successful organizations are especially vulnerable to large innovations: such organizations will be outcompeted by new organizations that embrace the innovations and bypass rent-seeking by losing agents from the outset.

Note that a crucial assumption behind the above results is the inability of the winner to compensate the loser (either up-front or after the change is adopted) for the losses he would experience following adoption. If such compensation was possible, the new (better) technology would always be adopted and the incumbent would not fail.

How vested interests block change: some cases

A classic case of resistance to change is the introduction of electronic trading in stock exchanges (an innovation that increases trade execution speed). NASDAQ has been an all-electronic platform since its inception, and the Cincinnati stock exchange went electronic in 1978. And yet the main stock market in the world, the New York Stock Exchange, had only gone so far as to implement a hybrid system in 2005, due to the blocking power of its specialists – who are losers in light of the technological innovation. As described in an in-depth account as late as 2003 (see Weiss, 2003):

[...] change at the NYSE is likely to be incremental at best – with the interests of his seat holders remaining a matter of paramount importance. Elimination of

the exchange’s floor-trading system, as urged by some exchange critics, would be the equivalent of burning the wallets of those 1,366 members – and it is not about to happen. The specialists are the exchange, and the exchange is [exchange CEO Richard] Grasso.

That is, a surplus enhancing innovation – i.e. one that reduces costs and increases consumer willingness to pay – is not implemented for a simple reason: those who are negatively affected by it block its adoption.

Another example of resistance to change is the derailment of efforts by management of established airlines to set up low-cost carrier subsidiaries in countries from the U.S. and Canada to Malaysia. The first wave of attempts to set up low-cost operations in the U.S. was confronted successfully in each case by unions who had much to lose.⁵⁸ As a union representative at United Airlines put it, referring to the lack of support by the union for “Shuttle by United” (a low-cost carrier that United was trying to establish): “why should current employees give up thousands of jobs and other cuts to fund up the start up of a new carrier which will only benefit corporate executives and others while it competes with us and drags us down even further?” (Rivkin and Therivel, 2005). Similarly, the unions at Delta Airlines fought hard between 1996 and 2000 to eliminate a pay differential in favor of Delta Express, and by 2000 “the differential was essentially gone” (Rivkin and Therivel, 2005). In Canada, in May 2011, members of the Air Canada Pilot Association rejected a pact that would have allowed Air Canada to start a discount leisure airline (see Jang, 2011). The efforts of Malaysian Airlines suffered a similar fate (see Chiu et al., 2014).

In an attempt to avoid resistance to change, organizations sometimes start “green field” sites away from the home base, with the objective of giving new ideas the best possible chance and avoid their being hampered at each stage by incumbents. This is of course not an ideal solution, since it may miss the possible synergies that make innovation an advantage for the existing organization. For example, Xerox, a copier based in Rochester, famously based its research on personal computers in Palo Alto, next to Stanford’s campus (the Palo Alto Research Center or PARC). While this organization was extremely successful at developing new ideas (the mouse, the Ethernet standards now underlying the internet and the graphical user interface were among the many ideas developed there) it did not succeed in making

⁵⁸Continental Lite (subsidiary of Continental Airways) lasted from 1993 to 1995; Delta Express (subsidiary of Delta Airlines) lasted from 1996 to 2003 and was replaced by Song, which lasted between 2003 and 2006; MetroJet (subsidiary of US Airways) lasted between 1998 and 2001; Ted (subsidiary of United Airlines) lasted between 2004 and 2009 (see CAPA Aviation Analysis, 2011).

Xerox profit from these ideas.⁵⁹

Note that all cases above involve organizations that were successful despite failures to adapt to change (in terms of the model, goodwill G is high). In contrast, if the prospects of an incumbent shrink sufficiently, e.g. to the point in which the firm's survival is threatened, desirable changes will more easily be adopted. It was only Sears Roebuck's near death experience in 1992 (\$4bn losses on \$52bn sales) that allowed for the defeat of resistance to closing the troubled and costly 101-year-old catalog business, a change long identified as necessary by consultants and analysts (Rucci et al., 1998, Schaefer, 1998).

Illustration of solutions

As suggested by the model, organizations best equipped to adapt to change are those which find ways either to credibly compensate losers or to avoid granting power, up front, to coalitions that are likely to oppose change.

First, losers can be compensated by “kicking them upstairs,” namely, allowing them to keep their job titles and earnings despite being largely irrelevant for the organization. Such agreements may in turn be self-enforced through an organization's reputation to offer safe career paths in which select senior employees are protected. For example, 81-year old Eugene M. Isenberg, CEO of Nabors Industries, the world's largest drilling contractor, was persuaded to relinquish control in exchange for a chairman position (see Mason, 2011). Similarly, after Google CEO Eric Schmidt was “kicked upstairs,” the press commented on the symbolism of a photo featuring a Toyota Prius: “[Co-owner and new CEO Larry] Page is in the driver's seat. [Co-owner Sergey] Brin is in the back seat. [Ex-CEO and new Chairman Eric] Schmidt is outside the car.” (See Gillmor, 2011.) Ex-ante contractual arrangements that achieve similar goals include granting employees tenure (which motivates agents to hire even those who could make them obsolete) as well as granting them golden parachutes upon departure.

Secondly, potential opponents can be denied blocking power. Of course, a priori it may be hard to know the direction of change and therefore who the losers will be. A solution is to defuse power in advance across individuals with varying areas of expertise. This solution is illustrated by professional service partnerships, where governance is highly defused. (In Kodak, by contrast, power was concentrated on chemical engineers; in airlines, on pilot unions.) As a result, professional service partnerships have proven adaptable in spite of large changes in their environment. McKinsey & Co., for instance, in response to more

⁵⁹See Hiltzik (2000) for an account of the remarkable inventions developed at this outpost.

complex client demands, went from recruiting almost exclusively MBAs to recruiting a large share of MDs, JDs and PhDs – as of 2014, roughly 1,400 of their 9,000 consultants are PhDs.⁶⁰

5.2 Rigid cultures and failures to manage relational contracts

Popular accounts of organizational disasters are plagued with references to “toxic cultures.” In those popular accounts, the word “culture” is rather broad and may refer to a variety of organizational features (such as incentive design, career paths, allocation of authority, or monitoring practices). In contrast, in this section we equate culture to the principles that govern “relational contracts” following unforeseen events, as proposed by Kreps (1990).⁶¹ We also consider the related concept of (rigid) organizational routines.

Agents interact repeatedly (both within and between organizations) and many of their actions are observable but not verifiable to outsiders. Such actions must therefore be governed by relational contracts, namely, informal agreements that prescribe self-enforced rewards and punishments. Relational contracts can be a powerful source of incentives because the rewards and punishments they support can be better targeted and more detailed than those available through court-enforced arrangements (see, for example, Bull, 1987, MacLeod and Malcomson, 1988, Kreps, 1990, Baker et al., 1994, 2002, and Levin, 2003).⁶² While intangible, an organization’s reputation for honoring its relational contracts may be one of its most valuable assets.

Companies go to great lengths to maintain their reputations. For example, Lincoln Electric is known for its implicit promises to share profits with workers. In 1992, when losses in its international operations wiped out its U.S. profits, the company borrowed \$50m to honor promised bonuses to U.S. workers, even though it had no explicit contractual obligation to do so (see Li and Matouschek, 2013, for a discussion).

Kreps (1990) notes that unforeseen contingencies – namely, states of nature that were not originally anticipated – place an organization’s reputation at risk because in such states

⁶⁰Source: McKinsey.com, accessed on 19/12/2014.

⁶¹See section 6.2 for an alternative notion of culture, due to Crémer (1993): the shared specific human capital of those in the organization, namely the knowledge of facts, rules of behavior, and codes.

⁶²Relational contracting, moreover, may itself influence the formal organization of a firm, as some forms of organization are more conducive to enforcing informal agreements than others (see, for example, Rayo, 2007). For detailed reviews of the literature on relational contracts, see MacLeod, 2007, and Malcomson, 2013.

agents may have contradictory expectations.⁶³ To protect its reputation, an organization benefits from having a clear and broadly-shared *principle* that guides behavior in these instances. Kreps equates culture to that principle (together with the manner in which it is disseminated among the relevant parties). Kreps also sketches the characteristics of a successful principle: it must be simple and consistent across time, making it a focal point around which parties can coordinate with minimal friction.

The difficulty is that the very features that make the principle successful at protecting an organization’s reputation, also make it rigid. As a result, “the culture/principle will reign even when it is not first best.” Indeed, “cases may arise in which everyone concerned understands that the principle is inefficient, yet still it will be applied” (Kreps, 1990, pp. 127-128). While highly appealing, Kreps’s view of culture has, to date, not been fully formalized. In fact, the very notion of a focal point, despite being a central determinant of behavior in coordination games (Schelling, 1960), has itself eluded formalization.

Related to Kreps’s notion of culture is Nelson and Winter’s (1982) notion of organizational routines: actions that, while not first best, are well-coordinated and are minimally prone to misunderstandings. In recent work, Chassang (2010) has formally explored how routines emerge over time. He presents a model in which players in a dynamic game can do no better than settle, after an exploration period, on a rigid routine. The advantage of such a routine is that it eliminates the incentive for privately informed agents to propose new inefficient projects with the sole purpose of extracting rents; its disadvantage is that it eliminates the possibility of new, more valuable projects being adopted.⁶⁴

To illustrate the role of culture and routines, as envisioned respectively by Kreps and Chassang, we present a simple extension of our baseline coordination game (first introduced in Section 2). This extension combines: (i) Kreps’s notion of culture as a focal point that governs actions in the light of unforeseen contingencies; and (ii) Chassang’s view that, in equilibrium, potentially better projects are rejected because it is unclear whether the indi-

⁶³A literally unforeseen contingency (one that parties never expected) can equivalently be interpreted as a foreseen contingency for which actions have simply not been specified ex-ante owing to complexity considerations. Relational contracts may also lead to foreseen (i.e. planned) failures that arise on the path of play. For example, Levin (2003) shows that when the principal must rely on subjective evaluations to reward an agent, relationship breakdowns on the path are needed to keep the principal from renegeing on promised payments (see also McLeod, 2003, Fuchs, 2007, and Halac, 2014). Alternatively, parties may hold private information regarding their payoffs and available actions, in which case breakdowns serve as a second-best screening device (e.g. Halac, 2012, and Li and Matouschek, 2013).

⁶⁴The specific routine that emerges in equilibrium is history dependent; a property emphasized informally by both Kreps (who argues that focal points are built on past experiences) and Nelson and Winter (who note that routines may be “evolved” features of an organization, rather than being explicitly designed).

vidual proposing them is actually adding value or rather seeking rents.⁶⁵ We use our baseline coordination game as our point of departure because it allows us to discuss relational contracting in the context of trade-offs between synergies and local adaptation.

Model 6. Failure to change established routines, culture

Consider an infinitely-repeated version of the baseline coordination game in Section 2. Suppose v_1 and v_2 (the outputs of the individual tasks) are independently distributed across periods. These individual outputs belong to the agents, whereas V (the output of the joint task) belongs to the principal and, as before, is known to all. All players expect V to remain unchanged over time. Recall that the principal does not know the values of v_1 and v_2 , but only their distributions. All actions are observable and outputs are non-contractible. Suppose $V < 1$, and so the optimal arrangement involves decentralization (with open communication among agents concerning the values of v_i).

Suppose further that the principal and the agents have entered a relational contract that prescribes, for each period, on the path of play, the following behavior:

1. The agents participate in the joint task if v_1 and v_2 are each weakly lower than a constant $B < \frac{1}{2}V$, and the agents participate in their individual tasks otherwise.
2. If both agents participate in the joint task, the principal pays each of them a (self-enforcing) bonus B . Otherwise, no transfers are made across players. (Note that if output V was contractible, these bonus payments could be enforced by a court and no relational contract would be needed.)

If the principal ever reneges on the promised bonuses, or any detectable deviation from an agent occurs, players separate forever – leading to zero outside options. We rule out other forms of monetary transfers in order to create a sufficiently rigid environment.⁶⁶

Each agent’s per-period expected payoff is

$$\begin{aligned}
 U_i(B) &\equiv \underbrace{\Pr[\max\{v_1, v_2\} \leq B] B}_{\text{Expected payoff from joint project}} + \underbrace{\Pr[\max\{v_1, v_2\} > B] \mathbb{E}[v_i \mid \max\{v_1, v_2\} > B]}_{\text{Expected payoff from individual project}} \\
 &= \frac{1}{2} + \frac{1}{2}B^3 > B
 \end{aligned}$$

⁶⁵A key simplification we adopt, relative to Chassang’s model, is that we omit the initial exploration period and instead assume that players have already settled on a routine.

⁶⁶Justifications for ruling out such transfers may include the presence of liquidity constraints and the desire to avoid haggling costs and rent-seeking behavior.

The principal’s per-period expected payoff is

$$\Pr [\max \{v_1, v_2\} \leq B] [V - 2B] = B^2 [V - 2B].$$

As a result, the principal finds it optimal to honor her promises (i.e. to pay $2B$ when called for) if and only if

$$2B \leq \frac{\delta}{1 - \delta} \underbrace{B^2 [V - 2B]}_{\text{Per-period expected payoff}}, \quad (7)$$

where $\delta \in (0, 1)$ is the players’ common discount factor and the R.H.S. of the inequality measures the principal’s continuation payoff on the path of play. We assume B is such that this constraint indeed holds. Note that under such arrangement, agents are also willing to truthfully share their local knowledge v_i .

We now assume, in the spirit of Kreps, that players have a focal point that governs behavior in the light of unforeseen contingencies. (Ideally, such focal point would be an outcome of the model, not an assumption. However, as noted above, economists have so far been unable to fully model the formation of focal points.) For concreteness, we assume that this focal point is the following simple principle: “do not change a prescribed set of actions unless agents agree to the change.”⁶⁷

Now suppose an unforeseen contingency arises: the opportunity to engage in a new joint project that delivers a (non-contractible) per-period value W larger than V . In the spirit of Chassang, the value W of the new project is known only to the principal.⁶⁸ From the perspective of the agents, in contrast, the new project can either deliver value W (with probability p) or value V as before (with probability $1 - p$). We assume that W is large, and so the efficient allocation in light of the new project involves agents always participating in such project.

Suppose that, upon discovering the unforeseen opportunity, the principal offers a new relational contract to the agents. This contract involves a rigid centralized arrangement in which both agents are instructed to participate in the new joint project every period, regardless of the realizations of v_1 and v_2 , in exchange for a bonus payment B' per agent no smaller than the original expected per-period payoff $U_i(B)$ (so that, in line with the focal

⁶⁷Such principle might have evolved, for example, because it protects workers from hold-up by their employers.

⁶⁸In Chassang’s model, the value of untested actions is known only by the agent selecting among different actions.

point, agents are not made worse off). Since $U_i(B) \geq \frac{1}{2}$, we must also have $B' \geq \frac{1}{2}$. We assume W is large enough that the principal prefers this new arrangement.

If the agents accept the new relational contract, there are two possible outcomes from their standpoint (since they do not know the true value of the new project). First, if the new project turns out to have value W , the new reneging constraint $2B' \leq \frac{\delta}{1-\delta} [W - 2B']$ would hold provided W is sufficiently large (which we assume is the case). As a result, the new relational contract would indeed be self-enforcing and efficient.⁶⁹ Second, if the new project turns out to have value V , the new reneging constraint for the higher bonuses B' would instead require that $2B' \leq \frac{\delta}{1-\delta} [V - 2B']$. Since $B' \geq \frac{1}{2}$, and $V < 1$, this inequality is never met (i.e. the R.H.S. is negative). As a result, the principal would renege on the new promised bonuses the first chance she gets.

Result 6. *In the culture model, players fail to exploit the unforeseen opportunity whenever both δ (the discount factor) and p (the agents' beliefs that the unforeseen opportunity has high value) are sufficiently small.*

Proof. When δ and p are small, we have

$$V > \frac{1}{1-\delta} B^2 [V - 2B] \text{ and } U_i(B) > pB'.$$

The first inequality implies that the principal would prefer the new relational contract even if the new joint project was worth only V (in which case, the principal would simply walk away after one period with a payoff V). As a result, if the principal were to propose the new relational contract, agents would need to assign a probability $1 - p$ that the value of the new joint project is only V (rather than W). The second inequality in turn implies that the agents would be, in expectation, worse off when accepting the new relational contract given these beliefs. ■

In sum, the firm is unable to take advantage of the unforeseen opportunity because its culture dictates that agents should be given de facto authority to block any change that is undesirable from their perspective and, simultaneously, these agents fear that the unforeseen opportunity is merely an excuse used by the principal to extract rents. As a result, even a legitimate, efficiency-enhancing opportunity will be rejected.

Three remarks are in order. First, if the principal was somehow capable of offering

⁶⁹The new reneging constraint differs from the original one in the size of the promised bonus, the value of joint output, and the fact that agents are now instructed to participate in the joint task with probability one.

sufficiently large payments to the agents up front, she could credibly signal that the new proposal is valuable and convince them to adopt it. Secondly, as we illustrate below, simply forcing the new project on the agents, without their explicit cooperation, would be considered a breach of trust and therefore likely lead to various forms of conflict. Thirdly, if upon the arrival of W , the existing project V also became less valuable (as in a new technology that makes the old technology obsolete), adopting the new technology is in general simpler; though, as we also illustrate below, a new viable culture may be required.

Culture and routines: some cases

As illustrated above, strong cultures coordinate behavior but also make it hard for organizations to adapt to changes in the external environment. A historical example of culture rigidities is that of the Maghribi traders in the Mediterranean studied by Greif (1994). Maghribi traders had a strong culture characterized by collectivist beliefs, which supported a horizontal, communication-intensive relational contract among them. However, this same culture added a rigidity that did not allow them to expand as fast as their Genovese competitors (historically organized more hierarchically, and thus relying less on networks of relational contracts) when the market grew.

A more recent example of rigidity has played out over the last 20 years as Hewlett Packard (HP) has tried to adapt its culture to a new environment. Under its founders Bill Hewlett and David Packard, and through the 1970s, the company culture was codified explicitly as “The HP Way,” which emerged when the company was small, decentralized, and highly innovative. The focal point that guided the relational contract was that employees would acquire individual responsibility for their tasks (together with significant autonomy) and communicate openly about their difficulties, in exchange for a job for life.

However, during the 80s the external environment changed dramatically, making the original focal point no longer feasible. HP’s product line changed, initially from testing and measurement systems to mainframes, and then (in the 90s) to personal computers and printers – both produced in highly competitive industries in which success depended less on innovation and more on efficiency and low production costs (as represented in the model by the unforeseen arrival of a project with large synergies W). The old culture no longer fit the business environment, as the transition to computers required more coordination/centralization for synergies to be materialized.

It has proven extremely costly to implement such change. As suggested by the model, it was not clear to workers how much of the new culture (in this case more centralized authority

and no job security) proposed by the bosses was simply a form of renegeing on their part: a breach of the implicit contract. During the 90s, Lewis Platt (CEO between 1993 and 1999) made an enormous effort to ‘adapt’ the HP Way to the new reality so as to retain a high level of cooperation, but without the job security of the past. Yet this attempt, being a violation of the original relational contract, and absent a convincing alternative, hobbled the company and led it to miss the internet opportunity. By the end of the 90s, the company abandoned this attempt and eventually adopted the standard (ruthless) employment practices in the PC industry. The HP Way eventually deteriorated to an equilibrium devoid of cooperation: “A company hailed for its vaunted ‘HP way’ – which emphasized employee autonomy – had stifled creativity to the point where workers now had a rueful phrase to describe the way they tuned out and pretended to be clueless when executives asked them to do something: ‘flipping the bozo bit.’” (Bandler and Burke, 2012.)

The rigidity of relational contracts is particularly apparent when companies try to change pay structures, perceived by employees as a cornerstone of such contracts. Credit Suisse struggled through the 80s and 90s to change the “star-system” compensation structure at its hard-charging First Boston subsidiary (acquired between 1988 and 1990). It first struggled with the departure of star bankers Wasserstein and Perella, and then with multiple rebellions by its American investment bankers, who felt short-changed by their new Swiss bosses’ efforts to reign in bonus pay (Stewart, 1993).⁷⁰ From the perspective of the investment bankers, Credit Suisse was renegeing on a promise. From the perspective of the Swiss bank headquarters, the compensation was not justified by performance.

Similarly, upon taking over as new CEO of Barclays, amidst a campaign to restore ethics to banking, Antony Jenkins promised that total pay would decrease as a percentage of group revenue to 35% from almost 40% (see Cooper, 2013). His promise was hailed by all in the press. One year later, after a *drop* in investment banking revenues, Jenkins reversed his approach and announced a substantial increase in the bonus pool, raising compensation from 39.6% to 43% of all investment banking revenues. The reactions of outsiders, including those of analysts,⁷¹ and business lobbyists,⁷² were universally negative (see Wilson, 2014):

Ironically, Barclays today is a prisoner of the market it helped to create.

⁷⁰We are grateful to Bob Gibbons for suggesting the Credit Suisse and HP Way cases.

⁷¹“Analysts said the big disappointment was the increase in the compensation ratio” (Goff and Arnol, 2014).

⁷² “[T]he harshest words came from the Institute of Directors, whose corporate governance director Roger Barker asked ‘for whom is this institution being run?’ after the bank paid out £2.4bn in bonuses but just £860m in dividends to shareholders” (Treanor, 2014).

Despite a fall in profits, the bank has had to go on paying bonuses, which have risen year-on-year in its investment bank by 10pc to £2.4bn despite a 37pc fall in pre-tax profits [...] In the meantime, [CEO] Mr Jenkins finds himself in the unenviable position of attempting to explain away higher bonuses at a time when the bank is well away from even making a return on shareholders' equity in excess of its cost. That is the legacy he has inherited - a culture his own bank created.

Illustration of solutions

Since culture itself tends to create rigidity, adapting to change often requires changing the culture itself. For instance, IBM successfully evolved from a declining mainframe manufacturer (mainframes were responsible for 90% of its profits in 1993) to the service integrator-consultant it is today. This transformation involved both recognizing that a wholesale change in culture was needed and selecting a new culture wisely in the sense of being an effective focal point.

When Lou Gerstner was appointed in 1993 as IBM's CEO, he identified its existing culture ("Excellence in everything we do, Superior Customer Service, Respect for the individual") as one of the key obstacles to any change. To him, "culture is not just one aspect of the game – it is the game" (Gerstner, 2002, p. 182).⁷³ The problem with the existing culture was that its focus on excellence resulted in a "stultifying culture of checks, approvals and validation that slowed decision making to a crawl" (p. 186).

But how does one change culture? As noted by Gerstner, "[y]ou can't mandate it, you can't engineer it" (2002, p. 187). While any discussion here is necessarily speculative, Gerstner adopted a solution that coincides with what is suggested by Kreps's analysis: he proposed a new focal point on which agents could readily coordinate.⁷⁴ Indeed, Gerstner's proposal illustrates what a successful focal point might look like. He adopted a specific mission (e-business) that created a wide-ranging context for all aspects of the organization, and therefore was simple to communicate and covered many unforeseen contingencies:⁷⁵

⁷³Gerstner's (2002) view of corporate culture coincides essentially with the one presented here: "[M]ost of the really important rules aren't written anywhere. Still, you can quickly figure out, sometimes within hours of being in a place, what the culture encourages and discourages, rewards and punishes. Is it a culture that rewards individual achievement or team play? Does it value risk taking or consensus building?" (p. 182.)

⁷⁴A key advantage in this case is that workers did not have to be convinced of IBM's impending doom: "Our greatest ally in shaking loose the past [...] was IBM's own precipitous collapse." (2002, p. 213.) The unforeseen contingency was in this sense visible to all – in terms of the model, a drop in V was evident.

⁷⁵Gerstner's mission is related to Van den Steen's (2014) notion of a "strategy" as a minimal set of choices capable of guiding all other choices in the organization.

I decided to declare e-business our ‘moon shot’, our galvanizing mission [...]. We infused it into everything –not just our advertising, product planning, research agendas and customer meetings, but through our communications and operations [...]. It provided a powerful context for all of our businesses. [...] Most important, it was outward-facing. [...] We were focused on setting the industry agenda again. We shifted the internal discussion from “What do we want to be?” to “what do we want to do?” (Gerstner, 2002, p. 213.)

The success of IBM’s new culture also suggests that ‘outward facing’ missions may be particularly good candidates for coordinating behavior.

6 Failures in the absence of incentive conflicts

Up to this point, we have studied failures due to incentive misalignments. However, organizations may fail even when the objectives of all agents coincide. The underlying reason for such failures is that agents are boundedly rational, i.e. given their cognitive limitations and finite time, they cannot compute the solution to every problem, nor can they make themselves precisely understood by others. Indeed, as Arrow (1974) points out, bounded rationality is the reason for the existence of organization: by acquiring more information than its members, it can maximally make use of their limited capacity.

The empirical literature has found evidence consistent with bounded rationality by exploring how recent advances in information and communication technology lead to “pure” coordination gains (that is, efficiency gains owing to better access and transmission of information above and beyond incentive considerations). Hubbard (2000) studies the impact of data recorders in trucks. He finds evidence in favor of both coordination gains (these instruments generate better information, allowing for better matching of loads with trucks) and incentive effects (they reduce agency costs by improving the monitoring of drivers’ pace and care). Garicano and Kaplan (2001) find substantive coordination gains with little incentive loss (due to increasing asymmetric information) resulting from the introduction of business-to-business electronic platforms for e-commerce. Athey and Stern (2002) also find evidence of substantive reductions in coordination costs as seen by lower mortality at ambulance arrival with the introduction of enhanced 911 systems. Paravisini and Schoar (2013) find both coordination gains (deriving from faster decisions) and incentive gains following the introduction of scoring systems in a bank lending process. Bloom et al. (2014) show

that the costs of acquiring and transmitting information affect the allocation of decisions between workers and managers (in a manner consistent with the models we study in this section). Rajan and Wulf (2006) show that hierarchies become flatter – spans of control of CEOs increase while the number of hierarchical layers decrease – following the adoption of information technologies.

Arrow suggests two ways in which organizations effectively acquire more information than individuals: first, by using hierarchies that economize on scarce time; second, by developing “codes” or “languages” that are adapted to the specific goals of the organization. Next, we discuss each of these two devices and how they may cause failures.

6.1 Hierarchy and the allocation of talent

Hierarchies economize on scarce time by ensuring that those giving directions are more talented than those being directed by them. As Demsetz (1988) points out, agents who require knowledge to produce but do not possess this knowledge themselves must have their activities directed. Lucas (1978) and Rosen (1982) formally show that when production requires making discrete, indivisible decisions (e.g. which product to introduce) that affect the performance of many agents, more talented agents should occupy higher hierarchical positions and manage larger firms. Garicano (2000) and Garicano and Rossi-Hansberg (2006) further propose that a hierarchical process of “management by exception” allows the most knowledgeable individuals in an organization to leverage their talent by guiding less knowledgeable (and less expensive) workers.⁷⁶

In this context, organizational failures arise when those giving directions lack the required talent. As Rosen (1982) notes, “the most capable foot soldier is not very effective if he is fighting the wrong war.” Since the talent of managers in higher positions affects the production of a larger number of workers, such failures will be more costly the higher a manager’s position. For instance, at the helm of Citibank at the time of the financial crisis was Chuck Prince – a lawyer who according to a senior banker, “didn’t know a C.D.O. [Collateralized Debt Obligation] from a grocery list” (Dash and Creswell, 2008) despite the fact that the bank had a \$45bn CDO exposure that proved nearly fatal.⁷⁷

⁷⁶A separate branch of the literature, which abstracts from talent allocation, studies hierarchies as devices to process information with minimum delay (see e.g. Radner, 1993, Bolton and Dewatripont, 1994, and Van Zandt, 1999). This literature finds that hierarchies reduce costs by allowing for parallel information processing, with agents transmitting sufficient statistics to their superiors on the basis of information they have collected.

⁷⁷Organizations may also fail when the horizontal match of tasks to talent is incorrect. The literature

Below we develop a simple model of talent allocation in the spirit of Garicano (2000) and Garicano and Rossi-Hansberg (2006). This model concerns a knowledge-based hierarchy in which the knowledge of agents higher up in the hierarchy, by virtue of being leveraged, has a greater impact on the organization. This model illustrates the costs of failing to place sufficient talent at the top of the organization.⁷⁸

Model 7. Knowledge hierarchies and talent misallocation

A firm has $N + 1$ agents (indexed $i = 1, \dots, N + 1$). Agents $i \leq N$ have low skill. Agent $N + 1$ has high skill. Agents are organized in a knowledge hierarchy as follows. Agents $i \leq N$ (the “workers”) attempt to solve one problem each. If they fail, they request directions from the remaining agent $N + 1$ (the “manager”) and re-attempt their problem using those directions. Problems come in two types. With probability $p \in (0, 1)$, a problem is low difficulty/low value (“simple”). If solved, a simple problem delivers value $v > 0$. With probability $(1 - p)$, a problem is high difficulty/high value (“difficult”). If solved, a difficult problem delivers value $V > v$. Problem difficulties are drawn independently across problems. Simple problems can be solved directly by any worker, whereas difficult problems can only be solved using the directions of the manager.

Assume the manager spends $h < 1$ (“help”) units of time giving directions to each worker who needs them, with a lower h representing lower communication costs (i.e. a better communication technology). Setting $h < 1$ captures the idea that the manager merely offers directions, without being directly involved in production. The manager faces a time constraint indicating that she must spend, in expectation, a total of one unit of time giving directions across workers. Since each of the N workers asks for directions with probability $1 - p$, this time constraint is $N(1 - p)h = 1$, which in turn pins down the size of the

has shown that when the primary goal of the organization is the “exploitation” of existing ideas (so that avoiding errors is crucial) talent should be assigned homogeneously across tasks (as in Kremer’s, 1993, “O-ring” theory cited in Section 2, and in Prat, 2002). In contrast, when the primary goal is “exploration” for new ideas (which has an option-value nature) talent should be concentrated on the most promising tasks (Grossman and Maggi, 2000). Relatedly, Sah and Stiglitz (1986) show that decentralized decision making facilitates creativity (organizations accept more projects, potentially too many) whereas centralized decision making reduces failure rates (organizations accept fewer projects, potentially too few).

⁷⁸The model below is simpler than that of Garicano (2000) and Garicano and Rossi-Hansberg (2006), as we assume that talent levels are exogenous and hierarchies have only one layer of managers. This simplification allows us to consider, in contrast to their work, problems with various difficulty levels and to discuss costs of talent misallocation.

manager's span of control N (as a function of h and p):

$$N = \frac{1}{h(1-p)}.$$

The expected output of the hierarchy is

$$N \underbrace{[pv + (1-p)V]}_{\text{Expected output per worker}} = \left(N - \frac{1}{h}\right)v + \frac{1}{h}V,$$

where the equality follows from the manager's time constraint.

Now suppose skill is misallocated: agent $N+1$ swaps positions in the knowledge hierarchy with some agent $j \leq N$. This change has two effects. On the one hand, the new worker $N+1$, having high skill, can solve any problem she faces. On the other hand, the new manager j , having low skill, offers useless directions. Expected output is now

$$\underbrace{(N-1)pv}_{\text{Expected output of low-skill workers}} + \underbrace{pv + (1-p)V}_{\text{Expected output of high-skill worker}} = \left(N - \frac{1}{h}\right)v + \frac{V}{hN}.$$

Consequently, the misallocation causes the following fraction of expected output to be lost:

$$\frac{\frac{1}{h} \frac{N-1}{N} \frac{V}{v}}{\left(N - \frac{1}{h}\right) + \frac{1}{h} \frac{V}{v}}. \quad (8)$$

The origin of this loss is twofold. First, the high-skill agent applies her skill to at most one high-value problem (a leverage effect). Secondly, the high-skill agent is less likely to encounter a high-value problem in the first place (a sampling effect).

Result 7. *In the hierarchy model, the (percentage) output loss (8) caused by talent misallocation is decreasing in communication costs h and increasing in the relative value of difficult problems $\frac{V}{v}$. Moreover, as either $\frac{V}{v}$ approaches infinity, or the probability that an agent needs directions $(1-p)$ approaches one (implying that N approaches $\frac{1}{h}$), this loss approaches $\frac{N-1}{N}$. Note that in a hierarchy with large N (e.g. one in which communication costs h are small), such loss represents approximately 100% of output.*

Proof. The result follows directly from observing the properties of expression (8). ■

An organization with a low value of h is one in which the manager can apply her skill to a large number of problems, which implies that the above misallocation is more costly. Similarly, an organization with a large $\frac{V}{v}$ represents one in which difficult problems are espe-

cially important to solve, which also implies that the misallocation is more costly. Finally, an organization with a value of N close to $\frac{1}{h}$ represents one in which difficult problems are likely to arise ($1 - p$ is large) and so the manager’s skill affects virtually every worker (analogous to a military commander deciding which war to fight).⁷⁹

Failures due to talent misallocation: some cases

A misallocation of talent at senior positions at the Spanish “Cajas” was at the center of a large scale financial meltdown that ultimately forced Spain to solicit a rescue from both the IMF and Europe. Cajas were a type of Savings and Loans that were run by political appointees, often without adequate experience or education. As Cuñat and Garicano (2010) document, the human capital of the Chairman of a Caja was closely correlated with the loan portfolio of the Caja before the crisis (in 2007) and with the loan performance of the Caja during the crisis. In particular, a Caja run by an individual with post graduate education, with previous banking experience, and with no previous political appointments was likely to have significantly less commercial real-estate lending as a share of total lending, a larger share of loans to individuals, a lower rate of non-performing loans, and a lower downgrade in its rating during the crisis. The magnitudes were significant: Cajas led by Chairmen with graduate studies devoted 7% more of their portfolio to loans to individuals and 5-7% less to real-estate loans. Despite the fact that they were more conservative during the boom, Cajas run by a priori better Chairmen also had a higher return on assets before the crisis. The role of banking experience was also significant. Indeed, the effects of education and experience were cumulative: a Chairman lacking both graduate education and relevant experience had around 40% more non-performing loans (relative to a Chairman with both these attributes).⁸⁰

A systematic mismatch between talent and positions has also been documented at family firms. A wide range of evidence shows that in such firms, family members are more likely to

⁷⁹When both types of project are equally valuable ($V = v$), the percentage output loss (8) becomes

$$\frac{1}{h} \frac{N-1}{N^2} = (1-p) \frac{N-1}{N},$$

which is large when the probability ($1 - p$) that each worker needs directions is large and, simultaneously, communication costs h are small, allowing for a large span of control N .

⁸⁰Prior to the crisis, the Cajas had grown in terms of both their number of “bets” (a large N in the model) and the magnitude of their individual bets (a large V in the model). For example, the assets of the largest failed Caja, Bankia, accounted for over 30% of Spain’s GDP. It is therefore not surprising that a lack of CEO talent had the potential to create a national crisis.

be chosen for top positions (see Bertrand, 2009, for a survey). Perez-González (2006) shows that companies whose founders appoint a successor within the family see a significant drop in their stock price. Similarly, by using as an instrument whether the first born child of the family in question is male or female, Bennedsen et al. (2007) identify a causal effect of family membership on firm performance of at least 4% of profits.⁸¹

Beyond a lack of expertise of the CEO, recent literature related to the financial crisis has uncovered the importance of expertise in a company’s board. For instance, Fernandes and Fich (2013) find that financial experience of outside directors is related to a reduction in bank failures and bailouts in the U.S. during the run up to the crisis; while Hau and Thum (2009) show that financial experience of directors is negatively related to write-downs and losses in Germany during the first phase of the financial crisis (see IMF, 2014, for a survey).

Illustration of solutions

Failures in the allocation of talent at all levels of the organization are hard to correct. After all, it takes a minimal level of talent to identify talent in others. A poorly informed board, lacking in the relevant expertise, will tend to select a low quality CEO independently of the directors’ incentives. A low quality CEO, in turn, will tend to surround himself with poor talent at lower levels of the organization, and so forth. Owing to the prevalence of large failures related to poor leadership, there is growing interest among regulators in improving board composition, especially in organizations whose failures create large externalities.⁸²

It is also crucial that those in charge of appointments and promotions, especially for employees whose talent is most leveraged, have rewards that are well aligned with the objectives of the organization. On this point, Bandiera et al. (2007) show that while managers on fixed wages favor hiring workers to whom they are connected, managers who receive performance bonuses favor hiring the most able workers, regardless of their social connections.

6.2 Coarse communication and code incompatibility

In practice, communication among agents is costly (even in the absence of incentive constraints) and therefore must necessarily be coarse. The degree of coarseness, however, is not

⁸¹While this sort of misallocation leads to lower profits, it need not necessarily constitute a failure of efficiency in privately held firms, since the family may well be maximizing a broader objective.

⁸²For instance, the Basel Committee on Banking Supervision (2014) makes the following recommendation: “46. The board should be comprised of individuals with a balance of skills, diversity and expertise, who collectively possess the necessary qualifications commensurate with the size, complexity and risk profile of the bank.”

exogenous – as Arrow (1974) points out, codes can be designed for efficiency. For example, the expression ‘revelation principle’ has a clear and useful meaning to economists, but very little meaning to anyone else.

The literature has recently started paying attention to coarse communication. Becker and Murphy (1992) show that communication costs limit the gains from specialization and thus economic growth. Crémer et al. (2007) consider a model of codes designed to deal with bounded rationality. They show that a narrow organizational scope allows for codes which are well designed for local environments at the cost of lowering potential gains from coordination. Ellison and Holden (forthcoming) study how codes limit the contingencies and plans that can be communicated across agents. They argue that (second-best) codes are path dependent and can therefore lead to persistent inefficiencies.⁸³

Simultaneously, an experimental literature has studied the evolution of codes. Camerer and Weber (2003) allow groups of subjects to develop their own way to describe pictures amongst themselves, and then merge different groups to study code conflicts. Selten and Warglien (2007) allow subjects to combine different letters to describe abstract shapes and study how communication among them emerges and evolves.

Below, we revisit our baseline coordination model (used in Sections 2 and 5.2) to illustrate how coarse communication may lead to coordination failures.⁸⁴ We rely on this particular model because it illustrates the value of using compatible forms of communication when agents participate in a collaborative project. We then illustrate the consequences of code incompatibility in practice.

Model 8. Coarse communication and code incompatibility

Consider the baseline coordination model of Section 2, in which each of two agents $i = 1, 2$ must decide to either pursue an individual task (worth v_i) or cooperate on a joint task (worth V). Recall that the joint task should ideally be selected if and only if $V \geq v_1 + v_2$. We assume that V is known to all, and v_i is known only to agent i , who in turn can communicate this value to his peer. In order to introduce bounded rationality, we shall assume that

⁸³A related literature following the team approach of Marschak and Radner (1972), has studied the consequences of limited communication under bounded rationality without making explicit the content of such communication (beyond the fact that it is costly). One branch of this literature, building on Weitzman (1974) studies resource allocation problems across ‘shops’ under limited information about the costs of different shops (see e.g. Crémer, 1980, Aoki, 1986, Geanakoplos and Milgrom, 1991, and Vayanos, 2003).

⁸⁴This model differs from the literature in that we restrict to a simple two-word ‘code’ overlaid on our baseline coordination game.

such communication is coarse. Specifically, individuals can only transmit a limited number of words describing the value of their individual task v_i . Throughout, we abstract from incentive considerations, i.e. agents simply follow a planner’s recommended course of action (footnote 85 discusses the effect of introducing incentives).

We begin by assuming that communication is impossible: local information v_i is known only by agent i . In this case, the planner can instruct agent i to follow any action she desires subject to the restriction that this action is contingent on v_i alone. As a result the best the planner can do, assuming she knows only the value of V , is to select a cutoff \hat{v}_i for each agent i and instruct him to participate in the joint task if $v_i \leq \hat{v}_i$ and to participate in his individual task otherwise. The solution to the planner’s problem is simple: she instructs both agents to either always participate (when $V \geq 1$) or never participate (when $V < 1$) in the joint task, regardless of their local knowledge (i.e. she either sets $\hat{v}_i = 0$ or $\hat{v}_i = 1$).

Coarse communication. We now allow for a coarse degree of communication. Suppose, in particular, that after learning his type, each agent sends one of two messages to the other agent (such as “high” and “low”), which corresponds to a two-word code in the terminology of Crémer et al. (2007). Upon receiving these messages, agents decide which task to participate in. (Equivalently, the agents send their messages to a planner, who then provides instructions to each agent.) We show that, despite its coarseness, this form of communication may considerably enhance efficiency.

The planner’s problem now consists in designing a mapping between the agents’ types and their messages, together with a course of action for the agents as a function of their types and the messages they receive. Given that each agent has only two messages available, and agents are symmetric, the planner simply asks each agent i to report whether his type is above or below a common threshold \hat{w} . The planner then instructs agents to participate in the joint activity if both of them report a type below \hat{w} , and to participate in their individual activities otherwise. Expressed as a function of the threshold \hat{w} , expected surplus is given by

$$\underbrace{\Pr [\max \{v_1, v_2\} \leq \hat{w}] V}_{\text{Expected joint output}} + \underbrace{\Pr [\max \{v_1, v_2\} > \hat{w}] \mathbb{E}[v_1 + v_2 \mid \max \{v_1, v_2\} > \hat{w}]}_{\text{Expected individual output}}. \quad (9)$$

Result 8(a). *In the coordination model with a coarse code, the optimal message threshold is given by*

$$\hat{w} = \min \left\{ 1, \frac{2}{3}V \right\}.$$

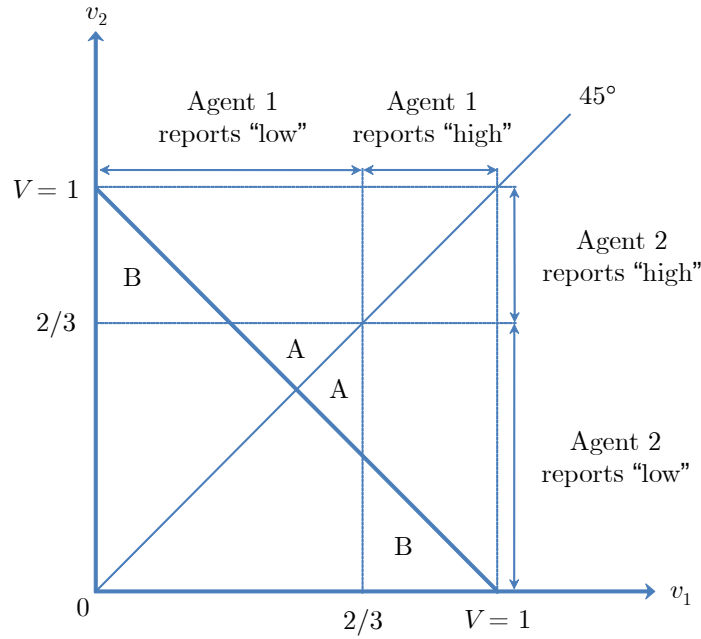


Figure 4: Coordination and codes. When $V = 1$, the optimal two-word code uses the message threshold $\hat{w} = \frac{2}{3}$. This code implements the first best except in areas **A** (in which agents suboptimally participate in the joint task) and in areas **B** (in which agents suboptimally participate in their individual tasks). Since in these areas the planner is close to being indifferent between the joint and the individual tasks (V is close to $v_1 + v_2$), the associated inefficiencies are relatively small (i.e. approximately 10% of total expected surplus).

Proof. After manipulation, expression (9) simplifies to

$$\hat{w}^2 V - \hat{w}^3 + 1,$$

which is uniquely maximized at the desired cutoff. ■

The resulting gains in surplus from using this simple code may in principle be quite large. For example, as depicted in Figure 4, when $V = 1$ (a worst case scenario for a rigid centralized allocation) the message allows the planner to gain nearly 90% of all surplus that was originally wasted.⁸⁵

Code incompatibility. A simple code has the important advantage of reducing com-

⁸⁵Recall that we have abstracted from incentive considerations. To see the impact of such considerations, consider a decentralized allocation, as in the baseline model, in which each agent i receives v_i when participating in his individual task, and receives $\frac{1}{2}V$ upon succeeding in the joint task. If agents can communicate with each other using a two-word code, prior to selecting their tasks, then the most efficient incentive-compatible cutoff \hat{w} is $\frac{1}{2}V$, since no agent wishes to participate in the joint task when $v_i > \frac{1}{2}V$. Using this code, players can achieve the same outcome as in the baseline model.

munication costs. Moreover, if the code is selected efficiently, using it may not result in any major losses in revenue (as illustrated in the simple example above). However, to be useful, such a code needs to be adapted to the specific environment (e.g. the distribution of values in our example). This feature creates a potential problem when several units or organizations must communicate: code incompatibility. Two organizations that have developed different codes will suffer misunderstandings and, as a result, all manner of coordination failures.

The following result presents an extreme instance of code incompatibility where agents misunderstand each other, but are not aware of such misunderstanding:⁸⁶

Result 8(b). *Consider the coordination model with a coarse code and message threshold $\hat{w} = \min \{1, \frac{2}{3}V\}$. Suppose agent 1 understands agent 2's word "high" as word "low" and vice versa, and agent 2 understands agent 1's words correctly. Such code incompatibility guarantees zero coordination on the joint activity, despite each agent sometimes attempting that activity.*

Proof. Agent i would only participate in the joint activity if he observes $v_i \leq \hat{w}$ and believes that $v_{-i} \leq \hat{w}$, a condition that can be met for each agent alone, but not for both agents simultaneously. ■

The destruction of output caused by such incompatibility might be quite large. For instance, as V approaches $\frac{3}{2}$ (and so the code cutoff \hat{w} approaches 1), the resulting loss of expected output approaches 100%.

Coarse communication and code incompatibility: some cases

Consider the 1994 Black Hawk incident in Iraq during the first Gulf War (see Snook, 2000, and Nissen et al., 2003). As emphasized by Crémer et al. (2007), owing to incompatible codes between the U.S. Air Force (USAF) and the U.S. Army, two USAF fighter jets fired missiles against two Army Black Hawk helicopters over a no-fly zone. The code incompatibilities were extensive, including the fact that the acronyms used to describe no-fly zones had distinct meanings to the Army and to the USAF (literally referring to different locations) and the fact that the "Identify Friend or Foe" codes were not shared by the USAF and the Army. As a result of this code conflict, the USAF pilots spotted the Black Hawk helicopters in an unexpected position, and upon the helicopters answering an electronic query by the USAF pilots with the wrong code, the USAF pilots shot them down (Snook, p. 157). The result was the loss of lives of both civilians and all the Army personnel involved.

⁸⁶Otherwise, if agents were aware that they do not understand each other, they would be back in the case of zero communication.

More broadly, a code is an instance of culture defined as “shared specific human capital” (in the words of Crémer, 1993) that allows boundedly-rational agents to save on communication costs. (Two other components of this human capital are shared expected rules of behavior, or conventions, and shared knowledge of facts.) In this sense, code incompatibility in the presence of costly communication is a metaphor for (and shares the same properties of) incompatibilities in the relevant stocks of specific human capital. What is often called “cultural conflict” in mergers can then be interpreted as an instance of such incompatibilities. As noted by Camerer and Weber (2003), “when two joined firms differ in their conventions, this can create a source of conflict and misunderstanding that prevents the merged firm from realizing economic efficiency.” The Daimler-Chrysler merger, for example, which we studied in Section 2, suffered from an incompatibility of cultures in this sense. German executives were used to larger staffs, larger travel budgets, and smaller salaries and bonuses than their Chrysler counterparts (Vlasic and Stertz, 2000). Each of these incompatibilities hindered communication and coordination whenever joint tasks were called for, as the respective stocks of human capital were adapted only to each side’s local environments.

Illustration of solutions

To avoid “culture clash” due to miscommunication, merging firms often make explicit investments in translating and sharing each other’s codes. For example, during the GE-Universal merger, “executives throughout the newly merger company have become both ambassadors and teachers, explaining the basics of the business to each other.” An executive even ran a “movie business 101” workshop, which included explaining such jargon as “tent-pole movies” and “franchise strategy” (Verrier and Eller, 2005).

Similarly, in large-scale engineering projects, there are explicit efforts to develop common codes. For instance, the development of the B-2 stealth bomber by Northrop, Boeing, Vaught, and GE involved the development of the ‘B-2 Product Definition System,’ which included explicit definitions of various parts and modeling rules (Argyres, 1999). This common code allowed designers from the different companies to participate jointly on the B-2 design, whereas in previous projects the difficulty of cross-company communication had required all designers (except those of stand-alone components) to be part of the same firm.

7 Conclusions

We conclude with a brief discussion of lessons that organizations can learn from the literature, and of lessons that the literature may extract from failure cases.

One general thread throughout our survey concerns the danger of high-powered incentives attached to objectively measured outcomes. The problem is not that monetary or career incentives fail to work. On the contrary, the problem is that they work “too well” at motivating the behavior that is being measured and thus, by necessity, they damage performance on dimensions that are harder to measure – the multitasking problem. In particular, high-powered incentives drive individual effort away from cooperation among team members (Section 2) and also drive individuals to seek high-probability payoffs in the short-term at the expense of exposing the organization to low-probability, catastrophic failures (Section 3).

The general response suggested by the literature to multitasking failures has three components. First, when output is hard to measure, organizations must reduce their reliance on high-powered, output-related incentives. Instead, they should rely on low-powered incentives and on incentives linked to inputs, rather than outputs (Prendergast, 2002). Secondly, as Holmstrom (1999) has noted, the firm is a ‘subeconomy’ and can use a broad set of tools – including decision rights, task assignments, relational contracts, culture, and hierarchies – to solve the coordination and motivation problems it faces. Indeed, it is precisely when desired outputs are hard to measure, and so incentives are imperfect, that firms play a vital role. As Gibbons (2005) has put it, no incentive problem is *just* a problem of incentives. Thirdly, to avoid multitask issues, organizations can rely variously on: selecting the “right” type of agents, such as agents who are intrinsically motivated by the aims of the organization (Prendergast, 2007, 2008); developing an identity (Akerlof and Kranton, 2005, and Bénabou and Tirole, 2011); and creating a sense of mission (Dewatripont et al., 1999).

Another critical source of failures is miscommunication (Section 4). Misaligned incentives with soft information result in non-credible (and thus coarse and biased) communication. Moreover, even when information is hard, high-powered incentives may lead bosses to prefer not to receive warnings from their subordinates. Truthful communication requires aligned incentives within the organization for which not only monetary incentives, but also intrinsic motivation in the form of identity or mission is desirable.

Our survey also suggests that managers must be mindful of the long-term consequences of their decisions (Section 5). Our analysis of vested interests suggests that the current al-

location of decision rights affects and constrains the organization’s future ability to change. Similarly, our analysis of culture (interpreted as the principle governing unforeseen contingencies) and of routines shows how both of them improve efficiency by reducing conflict in the presence of unforeseen contingencies, but also create long-term rigidities. While this area is by far the least developed in the literature we have surveyed, our analysis illustrates how short-term efficiency gains must be weighted against the constraints they place on future cooperation and change.

Finally, organizations must resolve coordination failures in the presence of bounded rationality (Section 6). Our analysis of talent allocation indicates that what matters is not merely the overall talent available to the organization, but how this talent is leveraged by assigning it to the right hierarchical positions. We also show that when communication is costly and messages are necessarily coarse, even a simple code can substantially improve efficiency. However, managers must note that a code that is better tailored to the needs of a particular set of agents poses a higher risk of code incompatibility across divisions and across firms following a merger: the strength of codes becomes its weakness. More generally, the trade-off between specificity and compatibility is true of all aspects of culture (interpreted as shared specific human capital).

Throughout, we have attempted to show that simple versions and variations of existing models take us a long way toward shedding light on large-scale malfunctions. For the failures we covered, only on two occasions we had to search for models outside of the organizational economics literature – leading us to revisit a classic variational model of risk-shifting (Section 3) and to introduce a new simple model on communication failures in the presence of potentially compromising information (Section 4.2).

As always with a case study approach, the reader may worry about the authors cherry picking the evidence to suit theoretical preconceptions (see e.g. Lepore, 2014). To minimize this concern, we have aimed to select our cases in a systematic fashion, with the guiding principle being their “notoriety,” defined as having both overwhelming media and academic impact as well as sufficient economic magnitude that either led to bankruptcy or required altering key design features of the organization.⁸⁷

⁸⁷We are grateful for a referee’s suggestion to refer to the ten largest bankruptcies between 1980 and 2014 as a form of external validation. These bankruptcies are, in decreasing size: Lehman Brothers, Washington Mutual, WorldCom, GM, CIT Group, Enron, Consec, Energy Future Holdings, MF Global Holdings, and Chrysler. (Source: BankruptcyData.com, http://www.bankruptcydata.com/Research/Largest_Overall_All-Time.pdf, accessed October 7, 2014.) This sample is of course biased away from non-business failures (e.g. the WMD fiasco or FBI intelligence

The existing literature has a number of limitations that invite future work:

First, we encountered two types of cases for which we found no formal theoretical explanations: the fact that the hierarchical positions of individuals may themselves result in information disruption (for example, as noted by Trivers and Newton, 1982, and Trivers, 2011, co-pilots may easily be intimidated by pilots – a phenomenon that has led to fatal accidents); and the fact that simple routinized procedures, such as short check lists, have proven helpful in some settings (for example, a simple five-point checklist for ICU catheterizations resulted in an 82% lower bloodstream infection rate, as described by Pronovost et al., 2006, and Gawande, 2010).

Secondly, our survey suggests some interactions between different sources of failure. For example, by increasing the extent of the conflict between the principal and the agent, decentralized authority (Section 2) aggravates all other incentive and communication problems we have discussed (Sections 3-5). In addition, the rigidities due to vested interests and culture (Section 5) are not only an impediment to technological innovation, but also make desired changes in organizational design harder to carry out. More broadly, firm capabilities derive from patterns of interrelated choices by firms. And yet very little is generally understood about such capabilities (although see, notably, complementarities in modern manufacturing analyzed by Milgrom and Roberts, 1990). Only small theoretical and empirical literatures have begun to explore why different firms show large and persistent performance differences in spite of their apparent similarity (a fact emphasized by Gibbons and Henderson, 2013).⁸⁸

Thirdly, although there is a growing empirical literature on organizations, much of the theoretical work we covered has not been systematically tested. This is particularly the case for resistance to change (Section 5) and shared specific human capital (Section 6).

failures), towards financial firms (given the recent crisis), and towards empire builders (given its selection on size.)

Our reading of these cases is that the bankruptcies related to the financial crisis – Lehman Brothers (covered in Section 3), Washington Mutual, CIT Group, and MF Global Holdings – all fall under the notion of intertemporal multitasking (discussed in Section 3). Similarly, Energy Future Holdings collapsed as a result of highly leveraged and wrongheaded bets on the rise of natural gas prices. WorldCom (noted in Section 3) and Consec are both textbook cases of empire building, an important source of failure that we mention in the introduction. The collapse of GM and of Chrysler (the latter covered in Section 2) were due to a combination of factors including, notably: a maladaptation of their organizational structure to the common platform world (covered in Section 2); communication biases due to incentive conflicts (covered in Section 4); failures to adapt to change (covered in Section 5); and incompatible codes (covered in Section 6). Falling out of our coverage would be Enron (a criminal case).

⁸⁸Examples of empirical work that may point in this direction by measuring complementary sets of organizational practices are Ichniowski et al. (1997), Brynjolfsson and Hitt (2000), Bloom and Van Reenen (2007), and Garicano and Heaton (2010).

Introspectively, researchers appear to agree that these aspects of an organization matter, but insufficient hard evidence has been produced to date. Empirical research on the determinants of centralization (Section 2) and on communication in organizations (Section 4) is slightly more developed, but is also in its infancy. The data difficulties are evident, but efforts to collect this data and test the theories should prove valuable.

Finally, much of the work we surveyed has been developed for a static context. However, organizations are dynamic and are characterized at least in part by repeated interaction among their many agents. Cultures (Section 5.2), languages (Section 6.2), and learning in hierarchies (Section 6.1) all evolve over time. Likewise, incentives for collaboration and information sharing are largely self-enforced rather than court-enforced. These topics are ripe for future theoretical work.

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