Research Statement
Marina Halac
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I am an applied theorist with a focus on understanding strategic interactions and the provision of incentives in settings of asymmetric information. Much of my work is concerned with dynamic incentives and how these are shaped by contracting constraints and the information environment. Different research questions have led me to examine different frameworks: I have studied contractual arrangements with formally and informally enforced payments, mechanism design without transfers, and games in which incentives stem from reputation. While motivated by applications, my research often involves the formulation of theoretical models with conceptual or methodological innovations.

A central question I am interested in is how a principal can incentivize an agent to take her desired course of action when there is a conflict of interest, and what are the distortions that arise when efficient incentives are not feasible. The problem is often difficult because of a number of reasons: both the principal and the agent may have private information about their actions and characteristics and may learn about these over time; the principal can rarely write contracts that cover all aspects of an agent’s performance and the use of transfers may be limited; and parties may learn over time about features of the environment that affect the optimal action and their incentives. These issues arise in a wide variety of applications, including employment relationships between firms and workers, the problem of motivating research and innovation, and the design of fiscal rules to constrain public spending.

My work can be categorized into four areas. First, I have studied the design of relational contracts, where payments between parties today are self-enforced by the threat of a breakdown in the relationship tomorrow. While the literature had previously focused on stationary arrangements, my research explores how relationships are built and evolve over time, and how this depends on information and bargaining power. Second, I have examined models of experimentation, in which a principal incentivizes an agent or a group of agents to work on a project whose quality is uncertain. Because agents learn privately about project quality as they experiment, dynamic considerations are key, and my focus has been on the
design of dynamic incentives and information disclosure policies. Third, I have studied the optimal tradeoff between commitment and flexibility, primarily motivated by the question of how to design fiscal rules for policymakers who are informed but biased. My work addresses dynamic mechanisms as well as the use of costly verification and the coordination of rules across countries. Finally, I have worked on reputation, including settings in which reputational concerns serve to provide good incentives and settings in which they actually lead to distortions. A main contribution of my research has been to endogenize the learning process and uncover how reputational dynamics vary with the form of learning.

1 Relational contracts

Formal contracts are generally unable to cover all relevant aspects of an agent’s performance. As a result, not only may formal contracts be ineffective, but also give rise to distorted incentives as agents emphasize only those aspects that are explicitly rewarded. In light of these concerns, parties often augment formal contracts with informal or relational contracts. End-year bonuses and promotions in firms are typically informal and depend on subjective measures of performance such as an employee’s initiative, cooperation, and so on. Relational contracts are also common in supply-chain relationships, inter-firm agreements, and credit markets. But relational contracts, too, are not without limitations. For the contract to be self-enforcing, the parties must prefer to honor the terms of the agreement and continue with the relationship rather than to renege and end the relationship. This means that the payments that each party can credibly promise to make, and hence the scope of incentive provision in a relational contract, are constrained by the value of the relationship.

A large literature, including the seminal work of MacLeod and Malcomson (1989) and Levin (2003), studies the design of relational incentive contracts but assumes that the value of the relationship is observable and exogenous. Thus, in this literature, parties promise the same payments in every period, and they always honor their promises. A main research agenda of mine has been to understand optimal relational contracting when the value of the relationship is either not commonly known or endogenous.

In “Relational Contracts and the Value of Relationships” (American Economic Review, 2012), I provide the first analysis of relational contracts under persistent private information about the value of the relationship. I consider a repeated interaction between a principal and agent, such as a firm and its workers, where the principal’s outside option is unobservable by the agent. Can the firm close up shop and take its operations elsewhere, or replace current employees with others of similar expertise? The inability to observe whether the principal places a high or low value on the relationship implies that the agent is unsure
whether the principal’s promises in a relational contract are trustworthy, and whether the principal would be willing to accept a given contract offer or would prefer to reject it.

The analysis reveals two key distinctions from the symmetric information setting: first, the relationship features rich dynamics, and second, these dynamics depend on bargaining power. The allocation of bargaining power essentially determines the source of inefficiencies. If the principal has strong bargaining power, she wants to overstate her value of the relationship to provide strong incentives for the agent to work hard and then renege on promised payments. On the other hand, if the agent has strong bargaining power, the principal wants to understate her value of the relationship so that the agent does not extract her rents.

The paper characterizes how information is revealed and how the relationship in turn evolves. If the bargaining power is on the principal’s side, incentives build slowly and the relationship becomes more productive over time, until either the principal reneges and the relationship ends, or incentives become stationary. If the bargaining power is instead on the agent’s side, the agent makes an initial offer that forces the principal to either permanently raise the agent’s pay or reject, but the relationship remains stationary thereafter. The results shed light on why incentives and effort follow different paths in different environments, and why some valuable relationships break down while others last for a long time.

In the above paper, the value parties place on the relationship is unobservable but exogenously given; thus, parties learn and adapt to new information but cannot affect the extent of their commitment. In “Investing in a Relationship” (*RAND Journal of Economics*, 2015), I endogenize the value of a relationship through ex-ante investments. I consider a principal who makes an upfront investment anticipating a repeated relationship with an agent, such as a firm that invests in plant and equipment before negotiating with workers. As it has long been recognized, the principal will have diminished incentives to invest if the agent may appropriate the returns through ex-post bargaining (Grout, 1984; Tirole, 1986). How does this holdup problem and efficiency depend on the relationship parties form?

While an extensive literature studies holdup in the context of a single exchange, in reality specific investments are often made at the beginning of a long-term relationship. This paper examines how upfront investments interact with ex-post incentives in such a case. One main result is that when the returns to the principal’s investment are observable, relational incentive contracts can be more efficient than formal contracts. Ex post, the inability to formally contract on performance implies an inefficiency, but, ex ante, this inefficiency actually helps reduce another inefficiency, namely that caused by holdup: because investment relaxes enforcement constraints, the principal invests more when incentives are relational. I also study the effects of the returns to the principal’s investment being unobservable to the agent, an
issue that relates to the paper described above and the question of whether firms can benefit from the use of audits or privacy rights. I show that unobservability of returns can eliminate the holdup problem, but also reduces the effects of investment on ex-post incentives. Which effect dominates, and thus the optimal policy for a firm, depends on bargaining power.

In “Relationship Building: Conflict and Project Choice over Time” (Journal of Law, Economics, and Organization, 2014), I study how relationships evolve from a different perspective. Suppose there are different types of projects or tasks parties can undertake; what is the optimal choice of project and how does it change over time? The model is inspired by the consultant-client relationship and, as such, features both private monitoring—the consultant is more knowledgeable about the difficulty of the client’s problem—and moral hazard—it is costly for the client to collaborate with the consultant. The combination of these elements gives rise to conflict: the client may end the relationship when the consultant claims the problem is difficult and asks for more fees. Moreover, I show that the possibility of conflict results in a risk-versus-return tradeoff which affects the optimal choice of project. The model predicts that consultants and clients start with low-risk, low-return projects, which minimize the risk of conflict and inefficient breakup. Over time, as they accumulate relationship capital, the parties switch to high-risk, high-return projects, which generate a higher per-period expected return. The probability of breakup decreases over the course of the relationship, but may jump when the parties move to a new type of project. I find that these predictions are consistent with evidence from the management consulting industry.

2 Incentives for experimentation

In the canonical moral hazard problem, an agent privately chooses costly effort which generates output for a principal. Conditional on effort, the distribution of output is known; in other words, there is no uncertainty about the quality of the project the agent works on. In reality, however, projects are often uncertain: their viability, difficulty, or profitability is unknown at the outset. An obvious example is research and development (R&D), where the probability of obtaining a successful innovation depends on not only effort but also the innovation’s feasibility. Parties learn about the quality of a project by experimenting, i.e. exerting effort over time and observing their outcomes. For a single individual, the experimentation problem is by now well understood. But what if a principal must incentivize an agent to conduct the experimentation, as it is often the case in R&D and other applications?

I have investigated this question in two papers together with Navin Kartik and Qingmin Liu. Our models of experimentation build on the workhorse exponential-bandit framework (Keller, Rady, and Cripps, 2005). A principal owns a project that may be either good or
bad. If the project is good, the probability that the project succeeds depends on effort; if the project is bad, success cannot obtain. Efficient experimentation here is characterized by a stopping rule: one should keep exerting effort until either a success arrives or pessimism grows to a point where the project is permanently abandoned. Our interest is in understanding how to optimally design contracts and mechanisms to induce agents to experiment.

In “Optimal Contracts for Experimentation” (Review of Economic Studies, 2016), Kartik, Liu, and I address the problem that an agent working on an uncertain project is likely to have some private information about his project-specific skills. The provision of incentives by a principal must therefore deal with not only learning about project quality and dynamic moral hazard, but also adverse selection on the agent’s ability. Our paper provides the first analysis of optimal contracting in the presence of these three elements, and shows that their interaction affects both the structure of dynamic incentives and efficiency.

In fact, the interaction of learning, moral hazard, and adverse selection introduces new conceptual issues. To screen whether the agent is a low-ability or high-ability type, the principal offers the agent two dynamic contracts. Now due to the nature of learning, the agent’s optimal effort profile in a given contract will generally depend on his type. Consequently, unlike in a standard adverse selection setting, there is the question of what effort profile an agent type would choose if he were to deviate (“go off path”) and accept the other type’s contract. Since off-path effort affects how much “information rent” the agent gets from a menu of contracts, and the contracts in turn affect the agent’s off-path behavior, this gives rise to a non-trivial fixed point problem.

Despite its complexity, we are able to solve the model and explicitly characterize optimal contracts. The contracts we describe are simple and resemble those used in applications. For example, we show that the principal can maximize her payoff by selling the project to the agent and committing to buy back output at time-dated future prices, similar to the arrangements observed for new technologies in contract farming. We pin down the sequence of prices and provide comparative statics. In terms of efficiency, we show that the principal optimally induces an agent of low ability to end experimentation inefficiently early, even though there would be no distortion without either adverse selection or moral hazard.

In “Contests for Experimentation” (Journal of Political Economy, 2016), Kartik, Liu, and I study how to optimally design a contest to induce agents to work on a specific innovation. Contests and prize awards have long been used to procure innovations, including scientific and medical discoveries and technological inventions. Motivated by applications, we depart from prior work on contest design by considering an innovation whose feasibility is initially uncertain. Agents learn over time through their own experimentation and based
on the information they are given about other agents’ experimentation.

The principal’s problem is to choose a prize and a contest design: a prize sharing scheme that specifies how the prize is divided among successful agents, and an information disclosure policy that specifies what information the principal discloses over time about agents’ outcomes. Since the principal’s goal is to maximize the probability of a success, an intuitive solution is to use a “public winner-takes-all contest,” in which any success is immediately disclosed to all agents and the first successful agent is awarded the full prize. In fact, we find that this contest dominates any other public as well as any other winner-takes-all contest.

However, our main result is that innovation can often be increased by using a contest that both limits disclosure and shares the prize among successful agents. Indeed, we find that under simple conditions a “hidden equal-sharing contest” is optimal. By hiding information about other agents’ outcomes, the principal keeps each agent more optimistic about the innovation when no success has been obtained, and we show this can improve incentives if (and only if) the prize is shared. Our work shows that the conventional presumption in favor of winner-takes-all schemes for innovation and R&D must be qualified when the feasibility of the innovation is uncertain. We believe this is important for both theory and practice. The paper has already motivated experimental work aimed at testing our theoretical results.

3 Commitment versus flexibility

The delegation problem, first analyzed by Holmström (1977), considers a principal who faces a better informed but biased agent. Unlike in most of the mechanism design literature, transfers between these parties are not feasible. The principal simply chooses a permissible set of actions and lets the agent select any action from this set. A variant is a self-control problem: an individual receives information and takes an action, but his preferences after information arrives do not coincide with those before. The individual chooses ex ante a set of actions from which he can select one ex post. These mechanism design problems reflect an interesting tradeoff between commitment and flexibility: commitment is valuable to constrain biased decisions, while flexibility is valuable to let decisions respond to information.

Together with Pierre Yared, I have explored this tradeoff in the context of fiscal policy. Our motivation stems from the fact that a large number of countries have adopted fiscal rules in recent years, yet not much is known about the optimal structure of such rules. Building on the work of Amador, Werning, and Angeletos (2006), we study a government that chooses borrowing and spending after privately observing a shock to the economy. The government is benevolent ex ante, prior to the realization of the shock, but present-biased towards spending ex post (for example because of political turnover). A fiscal rule trades off
the government’s desire to commit to not overspend against its desire to have flexibility to react to shocks. For a single government facing shocks that are uncorrelated over time and in the absence of other instruments, the optimal rule takes the simple form of a deficit or debt limit. Our agenda has been to understand optimal fiscal rules in richer environments.

In “Fiscal Rules and Discretion under Persistent Shocks” (Econometrica, 2014), Yared and I examine a setting as described above but in which, consistent with real-world evidence, shocks to the economy are persistent (rather than uncorrelated) over time. The mechanism design problem therefore features persistent private information, which complicates the analysis significantly. One contribution of our paper is to present a framework in which a full characterization of the optimal mechanism is feasible. We solve for the ex-ante optimal fiscal rule—a dynamic mechanism that maximizes welfare at the beginning of time—and contrast it with the sequentially optimal fiscal rule—a static mechanism that maximizes welfare at the beginning of each period. Unlike under uncorrelated shocks, we find that the ex-ante optimal rule is not sequentially optimal, as it provides dynamic incentives.

Specifically, fixed debt limits are no longer optimal when shocks are persistent. The ex-ante optimal rule is now history-dependent, with the level of fiscal discipline changing over time. We show that negative economic shocks that require high spending today are optimally followed by excessively lax rules tomorrow, while positive shocks that call for low spending lead to the reinstatement of discipline. Under persistent shocks, the expected cost of excessive flexibility tomorrow is larger when the shock to the economy is positive today, as the shock tomorrow is then more likely to be positive again. Consequently, we find that the threat of no discipline tomorrow serves to impose discipline today: the government has no incentives to increase spending and risk a breakdown in discipline in good times. Of course, during these periods of non-discipline used to provide incentives, the government accumulates high debt. We show, in fact, that while countries in practice often adopt fiscal rules to control the growth of debt, the ex-ante optimal fiscal rule can induce debt to become maximal in the long run.

Yared and I study another important aspect of real-world fiscal rules in “Fiscal Rules and Discretion in a World Economy” (R&R at American Economic Review, 2016): rules may be coordinated across countries, as in the case of the European Union. The paper examines a group of countries that choose deficit limits to constrain their spending and borrowing. We compare centralized fiscal rules, which are chosen jointly by the countries, to decentralized rules. The key distinction is that when countries choose rules jointly, they internalize the effects that rules have on the global interest rate.

The comparison between centralized and decentralized fiscal rules depends on govern-
ments’ present bias. We find that when the bias is small, the optimal centralized rule is tighter than the decentralized one: governments choosing rules independently do not internalize the fact that increasing flexibility leads to a higher interest rate, which hurts borrowing countries proportionally more. However, our main result shows that when governments’ present bias is large, the optimal centralized rule is slacker: individual governments do not internalize the fact that reducing discretion leads to a lower interest rate, which increases governments’ desire to borrow and worsens discipline for all. This result has implications that are relevant for policy and the current debate in Europe; for example, it shows that it can be beneficial to constrain countries’ surpluses in addition to their deficits. More broadly, our analysis reveals that a commitment to flexibility has positive externalities: the price of the temptation good increases with flexibility and acts as a natural disciplining device.

In “Commitment vs. Flexibility with Costly Verification” (in progress, 2016), Yared and I add a new tool to the mechanism design problem. We study fiscal rules that not only specify a set of spending levels the government can choose from, but also allow for the possibility of auditing the government and verifying its information at a cost. We find that introducing costly state verification into a delegation/self-control framework has novel implications for theory and applications. The audit problem is conceptually different from that in the seminal work of Townsend (1979), primarily because in our setting the disagreement in preferences is not extreme. In particular, it is not a priori clear whether an audit would be used here to reduce or increase the government’s spending.

Our results show that, under certain conditions, the optimal rule takes the form of a deficit limit with an “escape clause”: the government is allowed to choose spending without being audited up to a limit; if the government desires to spend above the limit after observing the shock to the economy, society conducts a costly audit and prescribes efficient spending after verifying the shock. It is noteworthy that this mechanism corresponds to rules commonly observed in practice, both in the context of fiscal policy and in other settings such as the delegation of investment decisions to managers in firms. Often in these situations, there are certain decisions that are not allowed unless a escape clause is triggered, and triggering the escape clause entails a costly review process before the decision is taken.

4 Reputation

When there are characteristics of an agent that are not observable, the beliefs others have about the agent constitute his reputation. Reputation plays a central role in many dynamic settings. The agent’s actions send signals (either directly or indirectly) about his characteristics, affecting the agent’s reputation and in turn his and/or others’ future behavior.
The classic application of reputation models is that of a firm which benefits from having a reputation for high quality. But there are many other applications; for example, my work on relational contracts described previously examines situations in which a firm may want to build a reputation for placing a high value on the relationship with workers. Reputation may be for an asset in which one can invest or for a fixed skill, and reputational concerns may provide good incentives or act as a source of distortions. Below I describe different settings I have studied in which reputation is key for understanding strategic behavior. I have been particularly interested in exploring how the nature of learning affects reputational dynamics.

In “Managerial Attention and Worker Performance” (American Economic Review, 2016), Andrea Prat and I develop a model of reputation to study the dynamics of employment relationships. The model posits that managers need to pay attention to be able to recognize (good or bad) worker performance. Workers’ incentives to exert effort therefore depend not only on compensation, but also on their beliefs about managerial attention. We model attention as an intangible asset that is subject to depreciation and in which managers can invest. How does reputation for attention affect investment incentives and worker effort?

The paper is related to my article “Relational Contracts and the Value of Relationships” in that it studies how workers’ beliefs about the manager’s type evolve and affect their incentives to work; here, however, a main issue is that workers’ beliefs will in turn also affect the manager’s incentives to invest over time. The interaction between worker effort and managerial investment is inherently dynamic, unlike in my article “Investing in a Relationship.” Methodologically, the paper contributes to the theory of reputation by endogenizing the learning process. While the literature assumes exogenous signals, we study a two-sided moral hazard setting in which information about the manager’s type arrives at a rate that depends on the worker’s action. Specifically, a verifiable signal arrives only if managerial attention is high, and its arrival rate depends on worker effort: it is increasing in effort if recognition is of good performance, decreasing in effort if recognition is of bad performance. The analysis highlights the implications of different forms of endogenous learning.

Our focus is on a setting in which workers are recognized and rewarded for good performance, such as in jobs based on innovation. We show that as time passes without recognition, workers get pessimistic about management’s attention and reduce their effort. Management may then respond by investing, but it will find it difficult to restore its reputation. In fact, our main result is that the relationship falls into deterioration: absent recognition, worker effort and eventually managerial investment decrease, and a return to high productivity becomes less likely over time. We show that these deteriorating dynamics do not arise when recognition is of bad performance, or independent of effort as in models of firm reputation.
I have studied how reputation affects experimentation outcomes in “Experimenting with Career Concerns” (in progress, 2016), together with Ilan Kremer. When a manager learns privately about a project over time, the market cannot assess the full consequences of his behavior, and the manager may want to take suboptimal actions that make a better impression. In particular, a manager may want to delay quitting a project if recognizing failure/lack of success hurts his reputation. We are motivated by the problem that bank managers may delay recognizing bad loans that reflect poorly on their skills. Empirical evidence suggests that banks roll over bad debt especially in good times, and there is a current debate on whether releasing more information about the quality of bank loans—by disclosing banks’ stress test results—can limit perverse incentives. We develop a dynamic model of career concerns to examine the pattern of distortions, the value of information, and the extent to which reputation effects owe to specific features of the banking sector.

Our work reveals that the nature of information managers receive over time is important for understanding distortions. The structure of debt contracts implies that banks get more information when a borrower is in distress and defaults than when the loan is paid in full; that is, bank managers learn about project quality from the arrival of bad news. We find that in such an environment, distortions increase when the expected quality of projects rises: while the probability of a bad project decreases, the manager’s reputational cost of abandoning the project increases, and we show that as a consequence the manager accumulates more losses when expected quality is higher. Furthermore, we find that while perfect information about project quality improves welfare, imperfect information can exacerbate distortions due to career concerns and be detrimental. These results differ from those that arise when managers learn about project quality from the arrival of good news, such as in venture capital. In a good news environment, distortions can decrease with expected project quality, and the value of information is always positive.

References to work by other scholars


