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On the contractual governance of research collaborations: Allocating control and intellectual property rights in the shadow of potential termination

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ABSTRACT

This paper investigates the governance design problem of a large company that wants to engage a small and cashless firm into a research collaboration. This analysis reflects the frequently observed collaborations between pharma companies and biotechs, and an actual research contract is assessed to link theory to practice. The governance form refers to the allocation of control rights over the research process and property rights over research output(s), as determined by the initial contract; yet this contract is incomplete. The parties negotiate at a later stage from bargaining positions that depend on the initial choice of the governance, but they also contemplate the possibility that the collaboration will be terminated. By means of a simple model that captures the core aspects of the contractual environment, I answer a key research question: How should governance be designed in the shadow of potential termination to provide the research firm with the incentives to invest in the collaboration? First, it is in the company's interest to choose a governance form that eliminates the possibility of termination and stabilizes the collaboration whenever possible. Second, if the collaboration cannot be stabilized, the company faces a trade-off between reducing the probability of termination and providing incentives, which is ultimately resolved by making the collaboration highly unstable. Third, property rights and control are substitutes in the governance design: If the company collects more property rights, it must relinquish more control rights.

1. Introduction

The formal contracts that underlie alliances and collaborations between firms produce a large variety of governance forms. In research collaborations, for example, in addition to spelling out the allocation of intellectual property rights over research outputs, contracts establish the configuration of control over the research process. Yet research contracts remain incomplete; they cannot establish clearly how the benefits from continued collaboration should be shared between the partner firms. Moreover many inter-firm relationships, as highlighted by Kale and Singh (2009), present a paradox, in that they are sources of competitive advantage (Dyer and Singh, 1998), yet they are also widely exposed to failure and prone to disintegration (Kogut, 1989; Parkhe, 1993; Doz, 1996).

Research collaborations in the biopharmaceutical industry offer clear examples of the use of formal contracts, governance forms, and instability, and I shall discuss them in detail, using the contracts that link pharma companies and biotechs. These contracts have become increasingly complex, with clear allocations of intellectual property rights (IPRs) and control rights, but research collaborations remain very unstable. According to a Bio Partnering report from 2004:[1]

> Large pharmaceutical companies and biotechs have achieved a level of deal-making sophistication. Still, less than half of respondents reported that their alliances were successful [...] better alliance governance practices could salvage 85% of the value now lost to failed partnerships – a potential sum of US$2.7 billion.

In this article, I therefore develop a model that captures the core aspects of the contractual governance of research collaborations. On the one hand, I provide an incentive-based rationale for how control over the research process and property rights over the research outputs get allocated between the participant firms. On the other hand, instead of interpreting instability as a symptom of inaccurate governance practices or a natural consequence of the limitations to contracting, I take a different perspective and ask: How do accurate governance choices affect the instability of a collaboration?

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[1] This biotech industry survey is produced by the IBM Institute for Business Value.

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The model is designed to represent a research collaboration between a large pharma company and a small biotech. The company and the biotech sign an incomplete contract ex ante, that allocates control rights over research and property rights over the outputs. The contract is incomplete, and the parties anticipate that they will negotiate ex post to allocate the benefits from continued collaboration. Yet, the initial contract sets the boundaries for the negotiation, as the parties expect to obtain a larger negotiation payoff when they are assigned more control and property rights. They also contemplate the possibility that they might prefer to terminate the collaboration.

Besides distinguishing between ownership and control, and showing that they are sensitive to different elements and have different incentive effects, I add two aspects that provide a more nuanced analysis of the role of governance. First, the probability of termination is endogenous to the model, as well as linked to the allocation of property rights. Second, the parties' relative bargaining position shifts according to the allocation of control rights, which helps us explain how the value created gets allocated between the firms. From a modelling perspective, the pharma company acts as the principal that designs governance forms and provides funding to a cashless biotech, the agent, which must make a nonverifiable value-creating investment.[2]

The analysis highlights that a clear definition of ownership patterns and configurations of control is crucial to address moral hazard and potential termination simultaneously. From a positive standpoint, governance changes when the range of uncertainty over the benefits from continued collaboration varies and when the participant firms' relative evaluation of property rights in case of termination shifts. From a normative standpoint, I offer managerial prescriptions regarding how much control over the research process and how many property rights a company with a strong bargaining position should allocate to its partner to motivate value-creating investments.

The primary prescription is that when the principal (large company) retains more property rights than the agent (small firm), it also relinquishes more control to the agent to balance their relative bargaining positions and provide appropriate incentives to invest. In other words, when designing governance to provide incentives to invest, ownership and control should be considered substitutes. Moreover, an unstable relationship should not always be governed to minimize the probability of termination. Instead, this analysis illuminates an important trade-off for managing research collaborations, in which stabilization efforts conflict with the provision of incentives. A high probability of termination therefore may be effective to obtain larger value-creating investments by the agent.

2. Background and theory building

Analyses of the governance of transactions often rest on two main pillars: transaction cost economics (Williamson, 1975), which considers how governance structures vary with the nature of the transaction and related costs but does not address the impact of contracts on the relationship, and property rights (PR) economics (Grossman and Hart, 1986; Hart and Moore, 1990), which considers the incentive effects of property rights in a world of incomplete contracts.[3]

In the asymmetric power distribution that marks the study setting, the pharma company, or principal, initially has all the bargaining power. The initial governance choice thus reflects agency theory and the take-it-or-leave-it offer that the principal makes to the small biotech, called the agent. The parties anticipate that they can negotiate ex post, as new information arrives and the value from collaborating gets created, or else terminate their research collaboration and pursue their best outside option. The contractual allocation of ownership and control can help the principal to alleviate moral hazard due to the nonobservability of the agent's effort and deal with the termination potential.

Before explaining the details of the model, I offer a short note on the terminology. In the setting of this research, contracts are incomplete, and firms must negotiate in the future. Their expected benefits from collaborating depend on their relative bargaining position when negotiating. A firm's bargaining position depends on (i) its outside option, which is the largest payoff that the firm can obtain outside the collaboration, and (ii) its bargaining power, which explains the share of quasi-rents appropriated. The quasi-rents are simply the difference between the continuation value, or what the firms can obtain by staying together after having reconsidered the use of resources and assets as new information arrives, and the aggregate outside option, which is the sum of the parties' outside options. Consistent with the standard PR setup, I consider then the ex ante contracting stage when the governance is chosen, and the ex post negotiation stage, when the continuation value is allocated, though I also add an interim stage when firms use their resources and assets to create value and ameliorate their relative bargaining position.

I depart from existing literature along three lines. First, I disentangle control from ownership. The distinction between ownership and control rights in contract design is important empirically (Lerner and Merges, 1998; Elfenbein and Lerner, 2003; Baker et al., 2008). Section 3 contains an example of a research collaboration in which the research contract specifies in detail the allocation of ownership over four defined classes of research compounds, but also allows the biotech great latitude in conducting research, managing screening, and negotiating the required changes. The model therefore accounts for this separation of rights, in an attempt to provide some theoretically grounded explanations for the empirically observed patterns of ownership and configurations of control.

Second, I posit that power shifts through the allocation of control,[4] such that control rights are pie-splitting rights (Adegbesan and Higgins, 2010), according to the following reasoning: when they collaborate on a research project, the biotech and the pharma company have different goals. The biotech can engage in what has been termed project cross-subsidization (Lerner and Malmendier, 2010). More generally, a party that has more control over resources and assets can choose the most preferred direction of research and therefore capture more of the benefits from collaboration. For instance, in the study example, the contract is designed to provide the biotech with latitude to use the different compounds to pursue its own research purposes, in addition to receiving much control over research. The biotech can influence the research process to its advantage, especially as the extent of its control increases. Therefore, having more control is tantamount to having a greater ability to appropriate the benefits from collaborating or, in the

[2] Whereas this setting reflects the frequently observed sponsored research programs in the biopharmaceutical industry, it also reflects the case of a large company that owns expensive physical assets, financial resources, or reputation capital but that wants to engage with a smaller and financially constrained firm that has intellectual capital in research.

[3] Although I am mainly concerned with formal contracts, it is important to note that interfirm relationships may be supported by relational exchange arrangements based on trust. In this respect, relational governance and formal contracts can be substitues, as argued by Gulati (1995) and Dyer and Singh (1998), or complements, as shown by Poppo and Zenger (2002). For the effects of relational governance mechanisms and contractual agreements, see also Parmigiani and Mitchell (2009).

[4] This point is similar in spirit to Rajan and Zingales's (1998) model of access to core assets and to Hickson et al.'s (1971) work on the determinants of intraorganizational power, as well as Coleman's (1990, p. 462) analysis of "the drift of power to those who actually engage in the use of resources and away from those who have ultimate rights of ownership of those resources."