

# Disentangling Reputational Effects in Alliances

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We use a formal model to analyze the reputational implications of alliances and how reputational considerations affect firms' incentives to collaborate. An important consequence of alliances is that firms combine their reputations. In addition, firms' reputations may evolve following the announcement of an alliance and the observation of the performance of firms' joint initiatives. Our model allows us to isolate and characterize these reputational effects and to provide an integrated perspective of their impact on firms' incentives to form alliances. We show that reputational synergies are materially relevant, as they may give firms the incentive to form an alliance even if other motivations to collaborate are weak or nonexistent. Furthermore, our analysis uncovers that high-reputation partners are not necessarily preferable to low-reputation partners as a means to maximize the incremental joint profits obtained through alliances. Similarly, partners with high competence levels are not necessarily preferable to partners with low competence levels. These apparently counterintuitive results go against conventional wisdom. However, they follow naturally from a dyadic (or multi-sided) perspective that considers the impact of alliances on the profits of all firms, instead of focusing on the profits of a focal firm.

*Key words:* Reputation, alliances, alliance formation, partner selection

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## 1. Introduction

A firm's reputation can be broadly defined as an intangible resource that, contingent on the firm's past actions and outcomes, embodies public perceptions of the firm's ability to deliver highly valued outcomes (Fombrun 1996, Lange et al. 2011, Halebian et al. 2017). An extensive literature sees a firm's reputation as a signal of the firm's level of competence in different domains—such as the quality of its products or services, its financial health, or the effectiveness of its leadership—and argues that it can be a source of sustainable competitive advantage and above-normal returns (e.g., Weigelt and Camerer 1988, Fombrun and Shanley 1990, Fombrun 1996, Deephouse 2000, Hörner 2002, Bergh et al. 2010, Zavyalova et al. 2016). The impact of reputation on firm performance can be attested by several empirical studies. For example, Roberts and Dowling (2002) showed that firms with good reputations were better able to sustain superior profits over time; Greenwood et al. (2005) found evidence that a high firm reputation positively affects the performance of professional service accounting firms, as measured by revenues per professional; and Raithel and Schwaiger (2015) found a relationship between superior reputation perceptions of the general public and increases in shareholder value.

Previous research has demonstrated the relevance of reputation as a determinant of firms' decisions to form alliances. This literature largely focuses on reputation as a signal of competence to potential partners and discusses how it affects a focal firm's *opportunities* to form alliances (Dollinger et al. 1997, Stuart et al. 1999, Stern et al. 2014). By entailing a positive perception about the firm's ability to create value and attract other resources, a higher reputation is primarily seen as increasing the desirability of the firm as a potential partner, and thereby its propensity to engage in alliances. Notwithstanding, Gu and Lu (2014) highlight a counteracting mechanism through which a higher reputation may decrease a focal firm's *need* to form alliances, and thereby its propensity to do so, because the firm already possesses a valuable reputation and potentially other resources. These studies provide important insights about how firms' existing reputations, which result from their past actions and decisions, affect their opportunities and incentives to form alliances.

However, since a firm's reputation embodies public perceptions of its level of competence, the decision to form an alliance and the performance of the projects in which the firm participates may

constitute important signals of its level of competence, affecting its reputation.<sup>1</sup> Following Spence (1974), we define signals as activities or attributes that, by design or accident, alter the beliefs of, or convey information to, other players. Thus, if a firm's incentive to form an alliance depends on its level of competence, the announcement of the alliance may constitute a signal of the firm's level of competence, affecting its reputation. Similarly, to the extent that the performance of a joint project depends on the level of competence of the firm, project performance may convey information about the firm's level of competence. By focusing on how firms' *existing* (or *initial*) reputations affect their opportunities and incentives to form alliances, prior research largely overlooks these *dynamic* signaling effects of alliances on firms' reputations.

In this paper, we develop a game-theoretic model to analyze how reputational considerations affect firms' incentives to form alliances, taking into account not only the implications of firms' existing (or initial) reputations, but also the dynamic signaling effects of the observation of their decision to form an alliance and of the performance of the projects in which they participate. The model allows us to isolate different reputational effects and to shed some light on the intricacies of the link between firm reputation and alliance formation decisions. Specifically, our analysis addresses the following questions: What are the reputational implications of alliances? How do reputational considerations affect firms' incentives to form an alliance? How do firms' characteristics—such as their levels of competence, initial reputations, and projects—affect the impact of alliances on reputations and, thereby, on profits? What are the consequences for partner selection? How does the announcement of an alliance affect firms' reputations? What is the impact of the performance of projects implemented in the context of an alliance on firms' reputations?

There are two approaches to the modeling of reputations. Several authors have developed moral hazard models of reputation—that is, models where firms' actions are not observable, and analyze the conditions under which firms have the incentive to exert costly effort to develop or protect a valuable reputation (e.g., Klein and Leffler 1981, Shapiro 1983, Tirole 1996). A complementary research stream

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<sup>1</sup> In this paper, we refer to “project” broadly as any product, service, activity, initiative, or business conducted or implemented by one or more firms.

uses adverse selection models of reputation—that is, models where there is incomplete information about firms’ characteristics, and reputation corresponds to others’ perceptions or beliefs about those characteristics (e.g., Kreps and Wilson 1982, Milgrom and Roberts 1982).

We develop an adverse selection model of reputation. In our model, two firms face the opportunity to form an alliance and decide whether to pursue it. We define an alliance broadly as any situation where firms implement one or more projects jointly, instead of implementing all their projects independently. This definition encompasses, for example, joint ventures, franchising agreements, and situations where a firm outsources the production of an important component to another firm. Firms’ incentives to form an alliance are typically associated with the existence of synergies which, from the standpoint of the value of the partnering firms, make “the whole greater than the sum of the parts” (e.g., Damodaran 2005). We formalize this idea by assuming that firms form an alliance if the sum of their expected profits is higher under the alliance than under independent project implementation.<sup>2</sup> For concreteness, we consider that each project consists of producing and selling a product to consumers. Our model contemplates the possibility that firms may have motivations to form alliances that are independent of reputational considerations. These non-reputational synergies may result, for example, from the combination of other complementary resources and capabilities. Reputational considerations are modeled as follows. Each firm has an underlying quality (or level of competence) that affects the quality of the projects in which it participates. Furthermore, the quality of a project has a positive impact on its performance. A key assumption in our model is that a firm’s quality is known by both firms, but a “hidden characteristic” from consumers. Therefore, consumers form expectations about the qualities of the different projects (and associated products) which, in turn, depend on their expectations about the qualities of the firms that implement those projects.<sup>3</sup> These expected qualities correspond, respectively, to projects’ and firms’ reputations. Reputations may evolve over time: they may change when consumers observe firms’ decision to form an alliance, and the performance of the projects (and associated products)

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<sup>2</sup> The underlying assumption is that firms can transfer surplus between themselves without frictions, which makes overall beneficial alliances advantageous to both firms and the division of surplus is immaterial to firms’ decision. Although surplus appropriation considerations are obviously important to determine the value created by each firm in an alliance, this assumption allows us to focus on how reputational effects may generate synergies between partners.

<sup>3</sup> This formalization implicitly assumes that the different products are “experience goods”, i.e., goods whose value consumers can only fully ascertain after their purchasing decision.

in which firms participate. Firms' and projects' reputations are crucial determinants of firms' profits because consumers base their purchasing decisions on them. In addition, firms' and projects' qualities are important for profits because they affect product performance and, thereby, future reputations.<sup>4</sup>

The existing corporate strategy literature has identified several motivations for firms to form alliances, such as combining different complementary resources and capabilities (e.g., Dyer and Singh 1998, Dyer et al. 2004, Villalonga and McGahan 2005, Wang and Zajac 2007, Capron and Mitchell 2012), increasing market power and managing strategic interdependencies with competitors (e.g., Porter and Fuller 1986, Oliver 1990), or benefiting from economies of scale and overall efficiency improvements (e.g., Gomes-Casseres 1997). We contribute to this literature by analyzing how the interplay of reputational and non-reputational considerations affects firms' incentives to form alliances. In line with previous research, we obtain that firms' decision to form an alliance may be determined by non-reputational synergies. Crucially, we also identify situations where firms' decision is determined by reputational considerations. In such cases, the decision to form an alliance may depend in non-trivial ways on firms' reputations, on their qualities (or levels of competence), and on their participation levels in the jointly implemented projects. We obtain that reputational synergies may create the incentive for firms to form an alliance, even if no other motivation for firms to collaborate exists. Furthermore, due to reputational considerations, independent project implementation may be optimal in situations where other motivations for firms to form an alliance are present. This happens if the alliance has an overall negative impact on the reputation of the different projects and its non-reputational synergies are relatively low. These results are consistent with previous empirical findings about the importance of reputation as a determinant of firms' decisions to form alliances (Dollinger et al. 1997, Stuart et al. 1999, Gu and Lu 2014).

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<sup>4</sup> A firm may have different reputations, corresponding to the perceptions of different stakeholder groups, such as consumers, potential partners, investors, or public entities (e.g., Fombrun and Shanley 1990, Carter and Deephouse 1999, Halebian et al. 2017). As mentioned above, the existing literature on how firms' reputations affect their alliance activity largely focuses on reputation as a signal of firm quality (or level of competence) to potential partners (Dollinger et al. 1997, Stuart et al. 1999, Gu and Lu 2014, Stern et al. 2014). In contrast, we focus on reputation as consumers' perceptions of firm quality. The formalization of reputation as a signal of quality to potential consumers provides a very natural and intuitive avenue to discuss the different reputational effects. Furthermore, it reflects the idea that, in general, potential partners are better informed about each other's characteristics than other stakeholders, such as consumers. The implications of this assumption are discussed later.

Our analysis allows us to isolate and characterize three cumulative reputational effects—the *complementarity effect*, the *performance effect*, and the *announcement effect*—that influence firms’ joint profits and, when non-reputational synergies are not dominant, firms’ decision to form an alliance as well. The complementarity effect is the *direct* impact of an alliance on profits through the combination of the reputation of each firm with the projects of the other firm. Consider, for example, the alliance between the telecommunications equipment company Huawei and the legendary camera manufacturer Leica to jointly improve the photography experience provided by the Huawei P9 and P9 Plus flagship smartphones, launched in 2016 to compete with other premium smartphones from companies like Apple and Samsung. In this context, the complementarity effect corresponds to the direct impact of the alliance on the total profits of Huawei and Leica through the association of Leica’s reputation with the P9 and P9 Plus smartphones. The complementarity effect is positive if the alliance contributes to combine high reputations with high-value projects. This may be the case, for example, when a high-reputation firm engages in an alliance with a low-reputation firm that nonetheless has high-value projects. The discussion of the complementarity effect highlights the potential limitations of adopting a *focal-firm* perspective when analyzing firms’ incentives to form alliances (e.g., Hennart 1988, Balakrishnan and Koza 1993, Dollinger et al. 1997). While an alliance may increase the reputations and profits of the focal firm’s projects, that effect may be dominated by the negative impact on the reputations and profits of the other firm’s projects, and *vice versa*.<sup>5</sup> Following a dyadic (or, more generally, a multi-sided) approach that considers the impact of an alliance on the reputations and projects of *all* firms, we obtain that high-reputation partners are *not* necessarily preferable to low-reputation partners as means to maximize the incremental joint profits obtained through alliances. This result contradicts the conventional wisdom that high-reputation partners are always preferable.

The performance effect is the *signaling* impact of the performance of the projects in which firms participate on their reputations. Considering again the alliance between Huawei and Leica, the performance effect corresponds to the signaling impact of the success or failure of the Huawei P9 and P9

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<sup>5</sup> As Wang and Zajac point out: “Given that alliances (...) involve at least two firms, the drawback of adopting a focal-firm perspective is that it essentially provides a one-sided analysis of what is clearly a dyadic phenomenon” (2007: 1292).

Plus smartphones in competing with other premium devices, such as the Apple iPhone or the Samsung Galaxy S series, on the reputations of Huawei and Leica. We obtain that, under independent implementation of a project by a firm, good project performance necessarily signals a high quality of that firm, having a positive impact on its reputation. In contrast, under joint project implementation, if reputational considerations influence firms' decision to form the underlying alliance, a good performance of a joint project may have a positive or a negative impact on the reputation of a firm that participated in it. The driver of a potentially negative impact of the success of a joint project on a firm's reputation is an asymmetric attribution of responsibility for project performance by consumers, who may give the credit for the success of that project mainly to the other firm. If, in addition, firms' qualities are perceived to be negatively correlated, because an alliance is more likely to occur when firms' qualities are different, a success of a joint project may worsen the firm's reputation.

Despite the (counterintuitive) possibility of a negative performance effect, our model also allows us to identify situations where the impact of the performance of a jointly implemented project on a firm's reputation is necessarily positive. More specifically, we show that if a firm's contribution to a joint project is relatively high or the uncertainty about the quality of its partner is low, a success (failure) of a joint project has a positive (negative) impact on the firm's reputation. Since the relative contribution of a focal firm to a joint project is likely to depend on the project-specific resources owned (or controlled) by its partner, these results have interesting implications for alliances with "resource-rich" partners, which typically provide access to extensive resources, such as distribution networks, technology, and know-how (e.g., Stuart 2000). Furthermore, the uncertainty about the partner's quality is likely to depend on the partner's longevity and on whether people have already observed the performance of many of its past projects. This suggests that alliances with "mature" (or well-established) firms and alliances with "non-mature" (or less established) firms have markedly different reputational implications.

The announcement effect corresponds to the *signaling* impact of the announcement of the decision to form an alliance on firms' reputations. In the aforementioned alliance between Huawei and Leica, the announcement effect corresponds to the signaling impact of the announcement of that alliance on the reputations of Huawei and Leica. In contrast with the other two effects, the announcement effect

can only exist if reputational considerations affect firms' decision to form an alliance.<sup>6</sup> We obtain that in such cases the announcement of an alliance may have a positive or a negative impact on firms' reputations, depending on whether firms' incentive to form the alliance increases or decreases with their qualities. As with the performance effect, the sign of the announcement effect depends in a non-trivial way on the uncertainty that consumers have about firms' qualities and on firms' participation levels in the different joint projects. Specifically, our results suggest that while in the case of a mature (or well-established) firm the announcement of an alliance necessarily signals high quality, in the case of a non-mature (or less established) firm the opposite may happen. Thus, the announcement effect may create purely reputational incentives for a mature firm to form an alliance with a non-mature firm. Interestingly, this may be the case even if the reputation and the quality of the non-mature firm are relatively low. This result implies that, beyond access to new technologies, products and human capital, a mature firm's decision to collaborate with a firm without a well-established reputation (such as a start-up) may also hinge on the reputational benefits associated with the announcement of the alliance.

Fundamentally, our analysis and results highlight the importance of expanding the notion of reputational synergies in an alliance to include, not only the more *static* direct combinations of firms' reputations and profits (the complementarity effect), but also *dynamic* signaling effects resulting from the announcement of alliances and from the performance of joint projects. Ascertaining the impact of the announcement and performance effects is *a priori* challenging, as they are complex and endogenously determined. However, a perspective that focuses exclusively on the direct combinations of reputations and projects may lead to misguided decisions. In fact, we show that the combined impact of the announcement and performance effects on profits may counter and dominate the complementarity effect and, therefore, determine the optimal choice between forming an alliance and independent project implementation.

The remainder of the paper is organized as follows. We present the model in section 2. We then analyze the choice between an alliance and independent project implementation in section 3. After that, in

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<sup>6</sup> Intuitively, when non-reputational synergies are sufficiently strong and, as a result, firms form an alliance independently of their qualities (or levels of competence), their decision is not informative about firms' qualities, and thus has no impact on firms' reputations.



section 4, we characterize the three cumulative reputational effects associated with firms' decision to form an alliance. Subsequently, in section 5, we discuss the implications of our results and situate our paper within broader scholarly discussions. Finally, we make some concluding remarks in section 6.

## 2. Model

We develop a model where firms are endowed with projects. For concreteness, let us assume that a project consists of producing and selling a product. Two firms—*A* and *B*—are matched, meaning that they face the opportunity to form an alliance, by implementing jointly one or more of their projects. Alternatively, they may implement their projects independently. Since our focus is on how a pre-specified alliance affects firms' reputations (and, thereby, their profits), we take the pair of firms that face the opportunity to form an alliance and the configuration of the alliance as given, abstracting from firm search and matching processes in alliance formation.<sup>7</sup>

Firms' objective is to maximize their joint profits. This implies that side payments between firms are frictionless and, as a result, an alliance that increases joint profits makes both firms better off, allowing each firm to have some positive difference between its profit in the alliance and its profit when acting independently. In other words, we assume that an increase in firms' joint profits stemming from an alliance allows each firm to have a positive relational rent (Dyer and Singh 1998). With this assumption, we do not mean to downplay the importance of problems in transferring and dividing surplus within alliances, and associated issues of trust, commitment, and moral hazard between partners (e.g., Khanna et al. 1998, Kale et al. 2000, Shah and Swaminathan 2008, Adegbesan and Higgins 2011). Rather, this assumption is motivated by our interest in isolating and analyzing how the interplay of reputational and non-reputational effects influences the potential for synergies in alliances, which exist when the total value of firms under an alliance is greater than the sum of their standalone values (e.g., Damodaran 2005, Cabral and Pacheco-de-Almeida 2019). The assumption that firms' objective is to maximize their joint

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<sup>7</sup> The assumption that the pair of firms that face the opportunity to form an alliance is exogenous contrasts with standard assumptions in network theory about the endogenous emergence of organizational networks, for example. This literature emphasizes how search and matching processes are affected by embeddedness in organizational networks, which reduces the uncertainty about partners in terms of their resources, needs, trustworthiness, and propensity for opportunistic behavior (e.g., Gulati and Gargiulo 1999). The assumption that the alliance configuration is fixed is partially relaxed in the e-companion to the paper, where we extend the model to analyze firms' choice between an alliance with a wide scope and an alliance with a narrow scope.

profits is also consistent with a dyadic (or multi-sided) approach, whereby the impact of alliances on the reputations, projects, and profits of *all* firms involved is considered (e.g., Wang and Zajac, 2007).

- Insert Figure 1 here -

Figure 1 presents an overview of the model, highlighting the main parameters. In order to capture the reputational implications of firms' decision to form an alliance and of the performance of jointly implemented projects, we need a model with three periods (zero, one and two). In period zero, firms *A* and *B* decide whether to form an alliance. Firms *A* and *B* are endowed, respectively, with projects  $P_A$  and  $P_B$  that are implemented in period two. In addition, firm *A* is endowed with project  $P_C$  that is implemented both in period one and in period two. This formulation is a parsimonious way of capturing the performance effect—the impact of the performance of a project (in our model, project  $P_C$  in period one) on firms' future reputations and, consequently, on the future reputations of the same project (project  $P_C$ ) and of other projects of the two firms (projects  $P_A$  and  $P_B$ ). In each period in which a project is implemented, that project (and its associated product) either performs well or not.

Under independent project implementation, firm *A* implements projects  $P_A$  and  $P_C$  alone and firm *B* implements project  $P_B$  alone. Under an alliance, we assume that firms implement jointly *at least* project  $P_C$ , the project that is also implemented in period one. This allows us to capture the impact of joint project performance on firms' future reputations and, thereby, on the future reputations of their joint and individual projects. Thus, the model contemplates a wide range of alliances, encompassing situations where projects  $P_A$  or  $P_B$  are also implemented jointly, as well as situations where they are implemented independently. Firms' participation levels in joint projects are assumed to be fixed and exogenously determined. This assumption is consistent with our focus on the reputational implications of a given alliance, instead of firm matching processes and alliance configurations. Nonetheless, the model imposes no restrictions on the number of jointly implemented projects and on firms' participation levels in those projects. We denote the participation level of firm  $i$  in project  $P_j$  by  $\alpha_i^j \in [0,1]$ , with  $\alpha_A^j + \alpha_B^j = 1$ , for  $i \in \{A, B\}$  and  $j \in \{A, B, C\}$ . The fact that we consider a broad range of situations where firms combine their reputations and other resources implies that, although our analysis is framed in terms of alliances, our

model is sufficiently flexible to encompass other governance modes, such as mergers and acquisitions (M&As), which may correspond to situations where firms jointly implement all their projects.

## 2.1 Firms' and Projects' Qualities

We assume that a firm's level of competence can be summarized by a one-dimensional variable, its quality  $q_i \in [0,1]$ , for  $i \in \{A, B\}$ .<sup>8</sup> Firms' qualities (or levels of competence) affect the qualities of the projects (and associated products) in which they participate. If project  $P_j$  is implemented independently by firm  $i$ , its quality is given by  $q_i$ . If project  $P_j$  is implemented jointly, its quality is given by  $\alpha_A^j q_A + \alpha_B^j q_B$ , the weighted average of the qualities of the two firms, where the weights are the firms' participation levels in the project. This assumption captures, in a simple way, the idea that firms' individual qualities have spillover effects on joint projects.<sup>9</sup> The quality of a project affects its performance. A convenient way to formalize this idea is to assume that the quality of a project (and its associated product) is the probability that it performs well in a given period in which it is implemented.

## 2.2 Firms' and Projects' Reputations

A firm is assumed to know both its quality and the quality of the other firm. The implicit assumption is that matched firms are able to conduct some form of due diligence to evaluate each other's qualities and can do so accurately. In contrast, consumers do not know firms' qualities. Instead, they hold beliefs about those qualities. Consumers' beliefs determine firms' reputations. More specifically, we model a firm's reputation as the expected value of its quality (or level of competence) according to consumers' beliefs. For simplicity, we consider that consumers share a common set of beliefs about firms' qualities. This assumption is attuned to the prevalent theorizing practices on firm reputation, which assume collective inferences or assessments by a given stakeholder group (e.g., Carter and Deephouse 1999, Rindova et al. 2005, Mishina et al. 2012). These ideas are formalized as follows. Consumers' *initial beliefs* about firms' qualities at the beginning of period zero, that is, consumers' beliefs about  $q = (q_A, q_B)$  before observing whether firms decided to form an alliance, are described by the cumulative distribution function  $G(q)$ .

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<sup>8</sup> Obviously, a firm may have different levels of competence in different areas. Thus, in the same spirit of Cabral and Pacheco-de-Almeida (2019), we may think of quality  $q_i$  as a summary measure of the firm's levels of competence in different areas.

<sup>9</sup> The results obtained in this paper are not driven by this particular specification of how firms' qualities affect the quality of joint projects. This issue is addressed in more detail in the e-companion to the paper.

Thus, firm  $i$ 's *initial reputation*, which we denote by  $r_i$ , is simply the expected value of  $q_i$  according to the distribution  $G(q)$ , i.e.,  $r_i = \int q_i dG(q)$ .<sup>10</sup>

Consumers may revise their beliefs as new information becomes publicly available. They may update their beliefs at the end of period zero after observing firms' decision of whether to form an alliance. We denote this decision by  $d \in \{I, J\}$ , where  $d = I$  if firms decide to implement all projects independently and  $d = J$  if firms choose an alliance and, therefore, jointly implement (at least) some projects. Consumers' beliefs about firms' qualities after the observation of firms' decision  $d \in \{I, J\}$  are termed *interim beliefs* and are described by the cumulative distribution function  $G_1^d(q)$ . Thus, firm  $i$ 's *interim reputation* is denoted by  $r_i^d$ , and is such that  $r_i^d = \int q_i dG_1^d(q)$ . To focus on the reputational implications of alliances, we consider that consumers do not revise their beliefs if firms decide to remain separate and implement their projects independently ( $d = I$ ). This happens if consumers do not anticipate that firms  $A$  and  $B$  face the opportunity to form an alliance. In such cases, consumers do not revise their perception of firms' qualities if they observe that no (unanticipated) alliance occurs.<sup>11</sup> Thus, consumers may only revise their beliefs at the end of period zero if firms form an alliance ( $d = J$ ). This can solely happen if, besides observing firms' decision to form an alliance, consumers are somehow able to infer firms' participation levels in the jointly implemented projects. To capture this idea in a parsimonious way, we assume that consumers observe firms' participation levels in the jointly implemented projects.<sup>12</sup>

Consumers may also update their beliefs at the end of period one when they observe the performance of project  $P_C$ . We denote the performance of project  $P_C$  in period one by  $\varphi \in \{f, s\}$ , where  $\varphi = s$  if the project is a success, and  $\varphi = f$  if the project is a failure. Consumers' beliefs about firms'

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<sup>10</sup> In line with our abstraction from partner search and matching processes, we assume that firms' qualities are initially perceived as independent by consumers. This assumption allows us to focus on the impact of firms' decision to form an alliance and project performance on consumers' perceptions of firms' qualities.

<sup>11</sup> Technically, this corresponds to assuming an economy with a continuum of firms such that, in period zero, a countable (i.e., with probability measure zero) subset of the firms in the economy are matched one-to-one. Each matched pair of firms faces the possibility of forming an alliance, by jointly implementing some of their projects. Non-matched firms can only implement their projects independently. The assumption that consumers do not revise their perceptions of firms' qualities if no alliance occurs considerably simplifies the analysis and the exposition. It is important to note, however, that the key insights of the paper hold if consumers anticipate that firms  $A$  and  $B$  face the opportunity to form an alliance with some positive probability and, as a result, consumers may revise their beliefs if firms decide to implement their projects independently.

<sup>12</sup> Clearly, this assumption is less applicable to some empirical settings, such as upstream vertical collaborations and situations where franchised and firm-owned establishments co-exist. However, assuming inaccurate inferences by consumers about firms' participation levels in the joint projects would complicate the analysis substantially, with limited foreseeable insights. For example, the consideration of a probability distribution over participation levels would make Bayesian updating applicable both to consumers' expectations of firms' qualities (i.e., firms' reputations) and to consumers' expectations of firms' participations in joint projects.

qualities after the observation of firms' decision  $d \in \{I, J\}$  and the performance of project  $P_C$  are termed *ex-post beliefs* and are described by the cumulative distribution function  $G_2^d(q|\varphi)$ . Thus, firm  $i$ 's *ex-post reputation* is denoted by  $r_i^d(\varphi)$ , and is such that  $r_i^d(\varphi) = \int q_i dG_2^d(q|\varphi)$ .

Akin to the reputation of a firm, the reputation of a project  $P_j$  corresponds to consumers' expected value of that project's quality. Thus, it is equal to the weighted average of the reputations of the firms that implement project  $P_j$ , where the weights are the firms' participation levels in the project. We denote the reputation of project  $P_C$  in period one by  $r_{P_C}^d$ , given  $d \in \{I, J\}$ . We denote the reputation of project  $P_j$  (with  $j \in \{A, B, C\}$ ) in period two by  $r_{P_j}^d(\varphi)$ , given  $d \in \{I, J\}$  and the performance  $\varphi \in \{f, s\}$  of project  $P_C$  in period one. Projects' reputations are a crucial determinant of firms' joint profits, as consumers base their purchasing decisions of the underlying products on those reputations. In turn, firms' reputations are important because they determine the reputations of the projects in which firms participate. We analyze how projects' reputations evolve by tracking the evolution of firms' reputations.

### 2.3 Firms' Profits

We assume that all projects are always implemented and focus on the decision of *how* to implement them, that is, on the choice between independent implementation and an alliance. The revenue from a given project corresponds to consumers' valuation of the project (and its associated product). This means that, for all products, firms have all the bargaining power relative to consumers and, therefore, consumers pay their valuation. As in the models of reputation by Tadelis (1999) and Cabral (2000), this assumption allows us to ignore signaling effects through prices.

Specifically, we consider that the value that consumers attribute to a project  $P_j$  with quality  $q_{P_j}$  (and its associated product) in a given period is

$$V_j (1 + \mu q_{P_j}),$$

where  $V_j > 0$  is the basic value of the project and parameter  $\mu > 0$  captures the importance of project quality for consumer value.<sup>13</sup> This formulation reflects the idea that project quality is only a partial determinant of consumer value. Since consumers do not observe firms' qualities, they base their valuation

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<sup>13</sup> This formulation amounts to assuming that, for each project  $P_j$ , the mass of consumers of the associated product is operationalized by a representative consumer with unitary demand. Assuming an arbitrary number of consumers for each product would not change our results.

of a project on the project's reputation (i.e., on their expectation of the project's quality). Thus, the value that consumers attribute to a project  $P_j$  in a given period is actually

$$V_j \left( 1 + \mu \tilde{r}_{P_j} \right),$$

where  $\tilde{r}_{P_j} \in [0,1]$  is the reputation of project  $P_j$  in that period.  $\tilde{r}_{P_j}$  may correspond to the interim reputation of project  $P_C$  ( $r_{P_C}^d$ , for  $d \in \{I, J\}$ ) or to the ex-post reputation of any project ( $r_{P_j}^d(\varphi)$ , for  $j \in \{A, B, C\}$ ,  $d \in \{I, J\}$ , and  $\varphi \in \{f, s\}$ ). Note that parameter  $\mu$  then also captures the importance of project reputation for consumer value (and for project revenues).

Our model contemplates the possibility that an alliance generates synergies that are independent of reputational considerations. For simplicity, we formalize these synergies as cost reductions.<sup>14</sup> More specifically, let  $K > 0$  denote the total cost incurred by the two firms if all projects are implemented independently. Through an alliance, firms may achieve a cost-reducing synergy  $S \geq 0$ , with  $S < K$ . Naturally, parameter  $S$  should be affected by the level of compatibility between alliance partners—for instance, in terms of processes and routines, decision-making styles, and shared values and culture—an aspect that is deemed important for joint value creation and overall alliance success (Dyer and Singh 1998, Kale and Singh 2009).

Firms' joint profits consist of the revenues that they obtain from the various projects net of the total cost of implementing those projects. Thus, given decision  $d \in \{I, J\}$  and firm qualities  $q = (q_A, q_B)$ , firms' expected joint profits in period zero are

$$\begin{aligned} \Pi^d(q) &= V_A + V_B + 2V_C - K + \mathbf{1}_{d=J}(d)S \\ &+ \mu \left\{ r_{P_C}^d V_C + \sum_{j \in \{A, B, C\}} r_{P_j}^d(f) V_j + q_{P_C}^d \times \sum_{j \in \{A, B, C\}} \left[ r_{P_j}^d(s) - r_{P_j}^d(f) \right] V_j \right\}, \end{aligned}$$

where  $q_{P_C}^I = q_A$  and  $q_{P_C}^J = \alpha_A^C q_A + \alpha_B^C q_B$  correspond, respectively, to the quality of project  $P_C$  under individual and joint implementation. The first line corresponds to the profit component that does not depend on reputational effects: reputation-independent project revenues and costs, and potential non-reputational synergies (where  $\mathbf{1}_{d=J}(d)$  is an indicator function, with  $\mathbf{1}_{d=J}(J) = 1$  and  $\mathbf{1}_{d=J}(I) = 0$ ). The second line is the profit component that depends on reputations. The first term inside the squiggly

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<sup>14</sup> Since in our model a firm's reputation is the expected value of its quality, it would be problematic to operationalize quality synergies as arising independently from reputational effects. Furthermore, the assumption that firms' have all the bargaining power relative to consumers rules out synergies that would arise from decreased competition between partnering firms.

brackets corresponds to the reputation-dependent revenue stemming from project  $P_C$  in period one, which depends on the interim reputation of project  $P_C$  ( $r_{P_C}^d$ ). The second and third terms correspond to the expected reputation-dependent revenues associated with projects  $P_A$ ,  $P_B$ , and  $P_C$  in period two, which depend on ex-post reputations. Ex-post reputations are the reputations associated with a success of project  $P_C$  in period one ( $r_{P_C}^d(s)$ ) with probability  $q_{P_C}^d$ , and the reputations associated with a failure of that project in period one ( $r_{P_C}^d(f)$ ) with probability  $1 - q_{P_C}^d$ .

## 2.4 Equilibrium Concept

Since the model includes updatable consumer beliefs at multiple stages, we use *Bayesian* equilibrium as the solution concept. Given their qualities  $q = (q_A, q_B)$ , in period zero firms choose either to implement their projects independently ( $d = I$ ) or to implement (at least some of) their projects jointly through an alliance ( $d = J$ ). In equilibrium, this decision must be optimal for firms, which means that they form an alliance *if and only if*  $\Pi^J(q) > \Pi^I(q)$ . We denote firms' equilibrium strategy as a function  $\hat{d}(q) \in \{I, J\}$ , which characterizes firms' equilibrium decision for all  $q = (q_A, q_B) \in [0, 1] \times [0, 1]$ .<sup>15</sup> Firms' equilibrium strategy  $\hat{d}(q)$  must also be optimal given the evolution of consumers' beliefs (and, consequently, of firms' and projects' reputations). Moreover, consumers' beliefs (and, consequently, firms' and projects' reputations) must also be consistent with  $\hat{d}(q)$ . Thus, both the firms' decision and the evolution of reputations are endogenous, as they are jointly determined in equilibrium.

## 3. Firms' Alliance Decision

We now analyze firms' choice between forming an alliance and independent project implementation. The reputational effects that may influence this decision—the complementarity effect, the performance effect, and the announcement effect—are discussed in detail in the next section.

We start by focusing on situations where firms always form an alliance regardless of reputational considerations. This occurs when the non-reputational synergies associated with an alliance are sufficiently strong relative to the importance of reputation for consumer value (i.e., when  $S$  is sufficiently large relative to  $\mu$ ). The formal condition for this to happen is  $S > \mu[r_A V_C + r_B V_B + r_A^I(s)(V_A + V_C)]$  (see

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<sup>15</sup> Note that, while  $d \in \{I, J\}$  is a variable that denotes the firms' decision (which can be optimal or not),  $\hat{d}(q) \in \{I, J\}$  is a function that characterizes firms' optimal decision in equilibrium for all possible qualities  $q$ , as implicitly defined by inequality  $\Pi^J(q) > \Pi^I(q)$ . Without loss of generality, we assume that in the case of indifference (i.e.,  $\Pi^J(q) = \Pi^I(q)$ ) independent project implementation occurs.

the e-companion to the paper for more details). In such cases, non-reputational synergies *dominate* reputational considerations and, as a result, it is optimal for firms to form an alliance.

LEMMA 1. *If non-reputational synergies are sufficiently strong, in equilibrium firms always form an alliance, and reputational considerations do not affect their decision.*

*Proof of Lemma 1.* All proofs are presented in the e-companion to the paper.

Lemma 1 captures the idea that firms' decision to form an alliance is often determined, not by reputational considerations, but by motivations such as combining other complementary resources and capabilities or achieving economies of scale and other efficiency improvements (e.g., Dyer and Singh 1998, Dyer et al. 2004, Villalonga and McGahan 2005, Wang and Zajac 2007, Capron and Mitchell 2012). Although in such cases reputational considerations do not affect firms' decision, firms' and projects' reputations (and their evolution) are still important, as they affect firms' joint profits.

We also identify situations where reputational considerations affect firms' decision to form an alliance. This occurs when the non-reputational synergies associated with an alliance are not sufficiently strong relative to the importance of reputation for consumer value (i.e., when  $S$  is not very large relative to  $\mu$ ) and, consequently, non-reputational synergies *do not dominate* reputational considerations. The formal condition for this to happen is  $S \leq \mu[r_A V_C + r_B V_B + r_A^I(s)(V_A + V_C)]$ . In such cases, firms' decision to form an alliance may depend on their underlying qualities. This is so because firms' qualities affect the performance of the projects in which they participate and, thereby, the evolution of firms' (and projects') reputations. Lemma 2 lays out the different cases where firms' decision to form an alliance is determined by reputational considerations.

LEMMA 2. *If non-reputational synergies are not dominant, meaning that reputational considerations affect firms' decision to form an alliance, three broad types of alternative equilibrium configurations exist:*

- (i) *Firms form an alliance regardless of their qualities;*
- (ii) *Firms engage in independent project implementation regardless of their qualities;*
- (iii) *Firms form an alliance if and only if  $\Pi^J(q) > \Pi^I(q) \Leftrightarrow \gamma_A q_A + \gamma_B q_B > z$ , where  $\gamma_A, \gamma_B$ , and  $z$  are scalars, and either (iii.a)  $\gamma_A \geq 0$  and  $\gamma_B > 0$ ; or (iii.b)  $\gamma_A < 0$  and  $\gamma_B \geq 0$ .*

Equilibrium configurations (i) and (ii) correspond to cases where firms' decision is independent of their qualities, and therefore correspond to "pooling equilibria" in Bayesian equilibrium jargon (the



same is true for the equilibrium configuration previously showcased in Lemma 1). These two equilibrium configurations highlight the importance of reputational effects in different ways. Equilibrium configuration (i) shows that, even when non-reputational synergies are weak or non-existent, reputational synergies may still create the incentive for firms to form an alliance independently of their qualities. It is important to note that this equilibrium configuration encompasses situations where, due to reputational considerations, firms have the incentive to implement a project jointly, even if individual implementation by the firm with the highest quality is possible.<sup>16</sup> Equilibrium configuration (ii) shows that negative reputational synergies may create the incentive for firms *not* to form an alliance independently of their qualities, even in the presence of non-reputational synergies.

Equilibrium configurations (iii.a) and (iii.b) correspond to situations where firms' decision is *conditional* on their qualities, and therefore correspond to "semi-separating equilibria" in Bayesian equilibrium jargon. In both, firms form an alliance if and only if the inequality  $\Pi^J(q) > \Pi^I(q) \Leftrightarrow \gamma_A q_A + \gamma_B q_B > z$  is verified. Thus, each  $\gamma_i$ , which is endogenously determined in equilibrium, measures the marginal impact of the quality of firm  $i$  ( $q_i$ ) on firms' joint profits under an alliance relative to independent project implementation. Panels A and B of Figure 2 illustrate, respectively, equilibrium configurations (iii.a) and (iii.b), with  $\gamma_i \neq 0$  for  $i \in \{A, B\}$ .

- Insert Figure 2 here -

In Panel A, since  $\gamma_A > 0$  and  $\gamma_B > 0$ , the inequality  $\gamma_A q_A + \gamma_B q_B > z$  defines a region above a *downward-sloping* line in the space of firm qualities ( $q_A, q_B$ ) where firms form an alliance. Below that line, independent project implementation occurs. In Panel B, since  $\gamma_A < 0$  and  $\gamma_B > 0$ , the same inequality translates into a region above an *upward-sloping* line where an alliance occurs. Again, below that line, independent project implementation occurs.

In both equilibrium configurations, firms' incentive to form an alliance (weakly) increases with firm  $B$ 's quality  $q_B$ , as  $\gamma_B > 0$  in (iii.a) and  $\gamma_B \geq 0$  in (iii.b). The reason is that firm  $B$  has no project of its own in period one. As a result, quality  $q_B$  only has a (weakly) increasing effect on firms' joint profits if

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<sup>16</sup> Similar situations occur in the equilibrium configurations (iii) in Lemma 2. The equilibrium configuration in Lemma 1 also includes such situations, but in that case they stem from the presence of non-reputational synergies.

firms form an alliance, by affecting the likelihood of success of project  $P_C$  in period one. The case of firm  $A$  is different: since  $\gamma_A$  can be positive, negative, or zero, firms' incentive to form an alliance may increase, decrease, or remain the same with firm  $A$ 's quality  $q_A$ . The reason is that firm  $A$  participates in project  $P_C$  *both* under an alliance and under independent project implementation. As a result, quality  $q_A$  has a positive effect on firms' joint profits regardless of their decision, by affecting the likelihood of success of project  $P_C$  in period one in both cases. As discussed in detail later, the marginal impact of quality  $q_A$  on firms' incentive to form an alliance depends on firm  $A$ 's participation levels in the different projects under the alliance, on the uncertainty that consumers have about firms' qualities, and on the resulting impact of the performance of project  $P_C$  on firms' and projects' reputations.

The case of equilibrium configuration (iii.b) (represented in Panel B of Figure 2) brings forth the implication that a firm may prefer a low-quality partner to a high-quality partner. Under the assumption that firms' objective is to maximize their joint profits, the best partner for a given firm is the one that leads to the highest incremental joint profits of an alliance relative to independent project implementation. The intuition for the fact that a low-quality partner may be preferable than a high-quality partner is the following. Consider the case of firm  $B$ , which faces the opportunity to form an alliance with firm  $A$ . Since  $\gamma_A < 0$ , increases in firm  $A$ 's quality  $q_A$  have a higher positive impact on joint profits under independent project implementation than under an alliance, thereby reducing the incremental joint profits of an alliance. It follows that the incremental joint profits of an alliance relative to independent project implementation are higher if firm  $A$  has a low quality than if it has a high quality. Thus, for firm  $B$ , a low-quality partner is preferable to a high-quality partner.

Interestingly, the result that a low-quality partner may be preferable to a high-quality partner is also present in situations where firms always form an alliance, either because non-reputational synergies are dominant (Lemma 1) or because reputational synergies give firms the incentive to always form an alliance, regardless of their qualities (configuration (i) of Lemma 2). Although in such cases an alliance always occurs, the incremental joint profits of an alliance relative to independent project implementation may be greater with a low-quality partner than with a high-quality partner due to reputational considerations.

## 4. Reputational Effects

In this section, we analyze the three cumulative reputational effects associated with an alliance: the complementarity effect, the performance effect, and the announcement effect. We discuss how these effects influence the value created by an alliance and, when reputation independent synergies are not dominant, how they affect firms' choice between an alliance and independent project implementation.

### 4.1 Complementarity Effect

Under independent project implementation, each firm *fully* associates its reputation to its own projects. Firm *A*'s projects ( $P_A$  and  $P_C$ ) are implemented with firm *A*'s reputation, while firm *B*'s project ( $P_B$ ) is implemented with firm *B*'s reputation. In contrast, when a project is implemented jointly, each firm associates its reputation to the project only *partially*, and the project's reputation is the combination of the firms' reputations—specifically, the reputation of project  $P_j$  (for  $j \in \{A, B, C\}$ ) is the weighted average of the reputations of firms *A* and *B*, where the weights are firms' participation levels in the project (i.e.,  $\alpha_A^j$  and  $\alpha_B^j$ , respectively). The complementarity effect is the *direct* impact of an alliance on firms' joint profits through the combination of firms' reputations and projects.

In order to isolate the complementarity effect from the other reputational effects, we have to ignore the reputational implications of the announcement of firms' decision to form an alliance and of the performance of the projects they implement. To do so, when computing the complementarity effect, we set firms' interim and ex-post reputations equal to their initial reputations (i.e.,  $r_i = r_i^d = r_i^d(\varphi)$ , for  $i \in \{A, B\}$ ,  $d \in \{I, J\}$ , and  $\varphi \in \{f, s\}$ ). As a result, firms' joint profits become invariant to their qualities (i.e.,  $\Pi^d(q) = \bar{\Pi}^d$ , for  $d \in \{I, J\}$ ).<sup>17</sup> Furthermore, to isolate the complementarity effect we also ignore possible non-reputational synergies ( $S$ ) in an alliance.

The complementarity effect may contribute to increase or decrease the value created by an alliance, depending on whether the alliance has a positive or a negative impact on the combination of high-value projects with high firm reputations, relative to independent project implementation. This result is presented in Proposition 1.

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<sup>17</sup> This means that  $\bar{\Pi}^I = V_A + V_B + 2V_C - K + \mu\{r_A V_A + r_B V_B + 2r_A V_C\}$  and that  $\bar{\Pi}^J = V_A + V_B + 2V_C - K + S + \mu\{\sum_{j \in \{A, B\}} (\alpha_A^j r_A + \alpha_B^j r_B) V_j + 2(\alpha_A^C r_A + \alpha_B^C r_B) V_C\}$ .

PROPOSITION 1. *The complementarity effect is positive if and only if an alliance contributes to combine the high reputation of a given firm with the high-value project(s) of the other firm (i.e., if and only if  $\bar{\Pi}^J - S > \bar{\Pi}^J \Leftrightarrow (r_B - r_A)(\alpha_B^A V_A - \alpha_A^B V_B + 2\alpha_B^C V_C) > 0$ ).*

Proposition 1 establishes boundary conditions under which an alliance contributes to create value by combining the valuable reputation of a firm with the projects of another firm. Hence, it echoes well-established ideas about the value of partner complementarity in the alliance literature (e.g., Gulati and Gargiulo 1999, Chung et al 2000, Kale and Singh 2009). To understand the intuition behind inequality  $(r_B - r_A)(\alpha_B^A V_A - \alpha_A^B V_B + 2\alpha_B^C V_C) > 0$ , suppose, without loss of generality, that firm  $B$  has a higher reputation than firm  $A$  ( $r_B - r_A > 0$ ). In this case, the decision to form an alliance increases the reputation of project  $P_C$  in periods one and two (since  $\alpha_B^C > 0$ ) and possibly the reputation of project  $P_A$  in period two (since  $\alpha_B^A \geq 0$ ), while possibly decreasing the reputation of project  $P_B$  in period two (since  $\alpha_A^B \geq 0$ ). Thus, an alliance has a positive direct impact on firms' joint profits if the positive profit impact from the increase in the reputations of projects  $P_C$  and  $P_A$  dominates the negative profit impact from the decrease in the reputation of project  $P_B$ . This happens when the basic value of firm  $A$ 's projects, weighted by firm  $B$ 's respective participation levels ( $2\alpha_B^C V_C$  and  $\alpha_B^A V_A$ ), is larger than the basic value of firm  $B$ 's project, weighted by firm  $A$ 's participation level ( $\alpha_A^B V_B$ ). Thus, an alliance has a positive direct impact on firms' joint profits if it contributes to combine the high reputation of one firm with the high-value projects of the other firm, whereas it has a negative impact otherwise.

In situations where firms' decision to form an alliance is affected by reputational considerations—because non-reputational synergies are not dominant—, a positive complementarity effect favors the choice of an alliance and may influence equilibrium configurations. For example, in the equilibria presented in Lemma 2 (iii), a positive complementarity effect contributes to decrease the threshold level of quality  $q_B$  (for a given quality  $q_A$ ) above which firms choose an alliance. Furthermore, if the complementarity effect is sufficiently large, it may give firms the incentive to choose an alliance regardless of their qualities, as in the equilibria presented in Lemma 2 (i).

Proposition 1 also brings forth the counterintuitive implication that, from the pure standpoint of complementarities between firms' reputations and projects, a high-reputation partner is not necessarily preferable to a low-reputation partner. In our model, the best partner is the one that maximizes the

incremental joint profits of an alliance relative to independent project implementation. Due to the complementarity effect, an alliance may have a greater impact on joint profits if it involves a high-reputation firm and a low-reputation firm than if it involves two high-reputation firms. For example, if one firm has a high reputation and the other firm has a low reputation but high-value projects, an alliance may significantly increase the reputation of the projects of the low-reputation firm, thereby having an important impact on joint profits. This (apparently) counterintuitive result that a high-reputation partner is not necessarily preferable to a low-reputation partner goes against conventional wisdom on the impact of firm reputation on alliance formation, according to which a high-reputation partner is always preferable (Dollinger et al. 1997, Stuart et al. 1999, Gu and Lu 2014). However, this result follows naturally from a dyadic (or multi-sided) perspective that considers the impact of alliances on the projects and profits of *all* firms, instead of focusing on the projects and profit of a focal firm.

The analysis of the complementarity effect allows us to identify *opportunity* and *need* mechanisms that are analogous to those discussed in the literature on reputation and alliances (Dollinger et al. 1997, Stuart et al. 1999, Stern et al. 2014, Gu and Lu 2014). A higher reputation increases a firm's opportunity to create value by combining its reputation with other firms' projects, thereby increasing its incentive to form alliances. However, a higher reputation also decreases the firm's need to combine other firms' high reputations with its own projects, reducing its propensity to form alliances. Clearly, the opportunity of a given firm corresponds to the need of another firm, and *vice versa*. Thus, under a dyadic (or multi-sided) perspective that considers the impact of alliances on the projects and profits of all firms, the distinction between opportunity and need mechanisms becomes blurred.

More generally, the above discussion highlights some potential limitations of adopting a *focal-firm* perspective when analyzing firms' incentives to engage in alliances (e.g., Hennart 1988, Balakrishnan and Koza 1993, Dollinger et al. 1997). Indeed, to fully evaluate the value-creating potential of alliances, one should consider not only the impact of other firms' resources or capabilities on a focal firm, but also the impact of the focal firm's resources or capabilities on other firms (Dyer and Singh 1998, Kale and Singh 2009, Capron and Mitchell 2012).

## **4.2 Performance Effect**

Whenever consumers face uncertainty about firms' qualities, they update their beliefs about those qualities based on relevant information that becomes available. The observed performance of the projects in which firms participate constitutes an important source of relevant information, since firm quality is a determinant of project performance. The performance effect is the signaling impact of the performance of the projects in which firms participate on their reputations.

We capture the performance effect in our model by analyzing the impact of the performance of project  $P_C$  in period one on the reputations of firms  $A$  and  $B$ . This consists of comparing firms' interim and ex-post reputations ( $r_i^d$  and  $r_i^d(\varphi)$ , for  $i \in \{A, B\}$ ,  $d \in \{I, J\}$ , and  $\varphi \in \{f, s\}$ ) in equilibrium. Under independent project implementation, the performance of a given project affects *only* the reputation of the firm implementing it. In contrast, under an alliance the performance of any joint project affects the reputations of *both* firms. One implication of this difference is that under independent project implementation each firm's quality only affects the evolution of the reputation of that firm, whereas under an alliance each firm's quality affects the evolution of the reputations of both firms. Proposition 2 provides a broad characterization of the performance effect, contrasting independent project implementation with joint project implementation.

PROPOSITION 2.

- (i) *Under independent implementation of a project by a firm, project performance has a positive signaling impact on the reputation of that firm.*
- (ii) *Under joint implementation of a project by both firms, project performance may have a positive or a negative signaling impact on the reputation of one of the firms.*

Result (i) of Proposition 2 is intuitive. It states that, under independent project implementation, a success of a project of a given firm makes consumers revise upward their beliefs about the quality of that firm, increasing its reputation. Hence, there is a positive impact on the reputation (and profits) of the other projects in which the firm participates.

Result (ii) of Proposition 2 states that this is not necessarily the case under an alliance, where firms jointly implement one or more projects. Under joint project implementation, consumers may attribute the responsibility for a success or failure of the project mainly to a given firm. As a result of this asymmetric attribution of responsibility, following a success (or failure) of the joint project, it may

happen that the reputation of that firm increases and the reputation of the other firm decreases. This counterintuitive result crucially depends on firms' participation levels in the joint project being sufficiently uneven, and on their qualities being perceived by consumers as negatively correlated. Assume, for concreteness, that firms implement project  $P_C$  jointly and that the participation of firm  $A$  in that project is low. In the case of a success of project  $P_C$  in period one, consumers revise their beliefs about firm  $B$ 's quality upward (i.e., firm  $B$ 's reputation increases), because firm  $B$ 's participation in that project is high. Furthermore, following the observation of an alliance, consumers may perceive firms' qualities as being negatively correlated. This happens in situations like the one represented in Panel A of Figure 2 since, as quality  $q_B$  increases, a lower quality  $q_A$  is required for firms to choose an alliance in equilibrium (and *vice versa*). As a result, if firms choose an alliance and quality  $q_B$  is high, quality  $q_A$  is more likely to be low. Similarly, if firms choose an alliance and quality  $q_B$  is low, quality  $q_A$  is more likely to be high. This translates into a perceived negative correlation between qualities  $q_A$  and  $q_B$ . If this negative correlation is sufficiently high (in absolute value), following a success of project  $P_C$  consumers revise their beliefs about firm  $A$ 's quality downward (i.e., firm  $A$ 's reputation decreases).<sup>18</sup> Thus, if under the alliance the participation levels of firm  $A$  in projects  $P_A$  and  $P_B$  in period two are high, a success of project  $P_C$  in period one may affect negatively the reputation (and profits) of those projects.<sup>19</sup>

Despite these intricacies, we identify situations where, under joint project implementation, the performance effect is necessarily positive. As argued above, a negative signaling impact of joint project performance is only possible if, following the observation (or the announcement) of an alliance, consumers perceive firms' qualities as negatively correlated. This can only happen if firms' decision to form an alliance depends on their qualities. It seems reasonable to expect that, in real life, this is in general the case, as firms' decisions to form alliances are not likely to be independent of their qualities (or levels of competence). Nonetheless, by encompassing situations where non-reputational synergies are dominant, our model allows us to identify circumstances where firms form an alliance regardless of their

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<sup>18</sup> Note that, in our model, firms' qualities are initially perceived by consumers as independent. Thus, the perceived negative correlation between firms' qualities is generated *endogenously* by firms' equilibrium decision of whether to form an alliance, through consumers' interim updating of their beliefs.

<sup>19</sup> It is important to note, however, that to ensure that firms never have the incentive to make project  $P_C$  fail on purpose, we focus on equilibria where firms' joint profits are never higher if project  $P_C$  fails than if it succeeds (i.e., *sabotage-free* equilibria).

qualities (Lemma 1) and, as a result, the performance effect of a jointly implemented project is necessarily positive.<sup>20</sup> Proposition 3 establishes this result.

*PROPOSITION 3. If non-reputational synergies are dominant, the performance of a joint project has a positive signaling impact on the reputation of a firm that participates in its implementation.*

We also identify situations where non-reputational synergies are not dominant and firms' decision to form an alliance depends on their qualities, but nevertheless the performance effect of a jointly implemented project is necessarily positive. Proposition 4 highlights the corresponding *sufficient* conditions for the performance of a joint project (in our model, project  $P_C$ ) to have a positive impact on a firm's reputation.

*PROPOSITION 4. If non-reputational synergies are not dominant and firms' decision to form an alliance depends on their qualities, the performance of a jointly implemented project has a positive signaling impact on the reputation of a firm if:*

- (i) The firm's participation in the joint project is sufficiently high; or*
- (ii) Consumers' uncertainty about the other firm's quality is sufficiently low.*

Result (i) emphasizes the importance of firms' participation levels—or relative contributions—in determining the reputational effects of joint project performance. It follows naturally from the fact that, if a firm has a high enough participation level in a joint project, a success (failure) of that project will signal a high (low) quality of that firm to consumers.

The relative contribution of a firm to a joint project is likely to depend on its project-specific “resource richness”, that is, the extent to which the firm controls resources that are key for the implementation of that project. In this perspective, our results complement the existing literature on the implications of partnering with resource-rich firms. These firms are often considered the most valuable partners, as they provide access to extensive resources, such as distribution networks, technology, know-how and reputation (e.g., Stuart 2000). However, a number of studies suggest that an alliance with a resource-rich partner may undermine a firm's performance, either because such a partner may use its power to induce inordinate contributions from the firm and to appropriate a larger share of the value

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<sup>20</sup> Naturally, this is also the case when non-reputational synergies are not dominant, but reputational synergies nonetheless create incentives for firms to form an alliance independently of their qualities (Lemma 2 (i)).



created by the alliance (Bae and Gargiulo 2004, Lavie 2007), or because an alliance with a resource-rich partner may stifle the development of the firm's own capabilities, thereby bearing negative implications for its future growth (Singh and Mitchell 2005, Vandaie and Zaheer 2014). Result (i) of Proposition 4 suggests an additional implication of the resource richness of an alliance partner: whereas forming an alliance with a resource-constrained partner ensures that the success of a jointly implemented project has a positive impact on a firm's reputation, in an alliance with a resource-rich partner this may not be the case.

Result (ii) highlights that, when the uncertainty about the quality of one of the partnering firms is sufficiently low, the performance effect on the reputation of the other firm is positive. In those cases, since consumers have little uncertainty about the quality of one of the firms, the outcome of a joint project (or any project implemented by that firm) has little impact on the reputation of that firm. Moreover, since consumers face significant uncertainty *only* about the quality of the other firm, consumers' perceived correlation between firms' qualities is necessarily very low. Thus, a success (failure) of the joint project will signal a high (low) quality of the other firm, increasing (decreasing) its reputation.

This last result suggests an important difference between partnering with mature (or well-established) firms and non-mature (or less established) firms. In the case of a mature firm, consumers have lower uncertainty about firm quality, because the firm exists for a long time and consumers have already observed the performance of many of its past projects. In contrast, in the case of a non-mature firm—such as a start-up—consumers have substantial uncertainty about the firm's quality. Thus, our results indicate that, while in an alliance with a mature partner the success of a jointly implemented project will typically have a positive impact on the reputation of the firm, this is not warranted in an alliance with a non-mature partner.

### **4.3 Announcement Effect**

The announcement effect is the signaling impact of the announcement of the decision to form an alliance on firms' reputations. We capture the announcement effect in our model by analyzing the impact of the announcement of an alliance in period zero on the reputations of firms  $A$  and  $B$ . This consists of comparing firms' initial and interim reputations ( $r_i$  and  $r_i^d$ , for  $i \in \{A, B\}$  and  $d \in \{I, J\}$ ) in equilibrium.

The announcement of an alliance is a signal of firms' qualities to consumers when the decision to form an alliance depends on firms' qualities. As mentioned above, this is arguably the most common case in real life, as firms' decisions to form alliances are not likely to be independent of their qualities. Despite that, our model also allows us to capture situations where, due to sufficiently strong non-reputational synergies, firms choose an alliance regardless of their qualities (Lemma 1). In such situations, the announcement of an alliance does not affect firms' reputations.<sup>21</sup>

*PROPOSITION 5. If non-reputational synergies are dominant, the announcement of the decision to form an alliance has no signaling effect on firms' reputations.*

Proposition 6 characterizes the announcement effect when non-reputational synergies are not dominant and firms' decision depends on their qualities. These situations were previously considered in result (iii) of Lemma 2.

*PROPOSITION 6. If non-reputational synergies are not dominant and firms' decision to form an alliance depends on their qualities, the announcement of an alliance has:*

- (i) A (weakly) positive signaling impact on firm B's reputation (since  $\gamma_B \geq 0$ );*
- (ii) A (weakly) positive signaling impact on firm A's reputation if  $\gamma_A \geq 0$ ;*
- (iii) A negative signaling impact on firm A's reputation if  $\gamma_A < 0$ .*

The sign of the announcement effect on firm  $i$ 's reputation depends on  $\gamma_i$ , the marginal impact of firm  $i$ 's quality,  $q_i$ , on firms' profits under an alliance relative to independent project implementation. The case of firm  $B$ —considered in result (i) of Proposition 6—is trivial. Since firm  $B$  is not endowed with a project in period one, its quality  $q_B$  only affects firms' joint profits under an alliance, through its impact on the performance of project  $P_C$  in period one. In particular, if  $\gamma_B > 0$ , firms' joint profits under an alliance increase with quality  $q_B$ , thereby increasing firms' incentive to engage in an alliance. As a result, the announcement of an alliance signals a high quality of firm  $B$ , having a positive impact on firm  $B$ 's reputation. In contrast, if  $\gamma_B = 0$ , quality  $q_B$  does not affect firms' joint profits under an alliance.

The case of firm  $A$ —considered in results (ii) and (iii) of Proposition 6—is arguably more representative of the typical impact of the announcement of an alliance on a firm's reputation, as firm  $A$  is endowed with projects in periods one and two. As such, firm  $A$ 's quality  $q_A$  affects firms' joint profits

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<sup>21</sup> This is also the case when non-reputational synergies are not dominant, but reputational synergies create the incentive for firms to form an alliance independently of their qualities (Lemma 2 (i)).

under an alliance and under independent project implementation, in both cases through its impact on the performance of project  $P_C$  in period one. Thus, whether a higher quality  $q_A$  favors or discourages an alliance depends on whether the marginal impact of  $q_A$  on firms' joint profits is higher under an alliance or under independent project implementation (i.e., on whether  $\gamma_A$  is positive or negative). In the former case, which corresponds to result (ii) of Proposition 6 and to Panel A of Figure 2, the decision to form an alliance signals a high quality of firm A, thus having a positive impact on firm A's reputation. In the latter case, which corresponds to result (iii) of Proposition 6 and to Panel B of Figure 2, the decision to form an alliance signals a low quality of firm A, thus having a negative impact on firm A's reputation.

Despite the *a priori* ambiguous impact of the announcement of an alliance on a firm's reputation when non-reputational synergies are not dominant and firms' decision depends on their qualities, we identify *sufficient* conditions for a firm's reputation to increase or decrease. These conditions are summarized in Proposition 7.

**PROPOSITION 7.** *If non-reputational synergies are not dominant and firms' decision to form an alliance depends on their qualities:*

- (i) If the uncertainty that consumers have about the quality of firm A is sufficiently low and the uncertainty that consumers have about the quality of firm B is high, the announcement of an alliance has a positive signaling impact on firm A's reputation.*
- (ii) If the uncertainty that consumers have about the quality of firm A is sufficiently high and its participation in the focal project  $P_C$  under an alliance is sufficiently low, the announcement of an alliance has a negative signaling impact on firm A's reputation.*

Result (i) of Proposition 7 shows that the announcement of an alliance constitutes a signal of high firm quality if the uncertainty about the firm's quality is sufficiently low while the uncertainty about the other firm's quality is high. The intuition is the following. The fact that consumers have little uncertainty about the quality of firm A means that they have a relatively precise idea of quality  $q_A$ . Thus, if project  $P_C$  is implemented independently, its performance is likely to have a small impact on the reputation of firm A. However, if firm A forms an alliance, the performance of the (jointly implemented) project  $P_C$  will also affect the reputation of firm B. If consumers have significant uncertainty about the quality of firm B, the potential impact of the performance of project  $P_C$  on firm B's reputation is large. As a result, the quality of firm A will have a greater marginal impact on future firm reputations and joint profits if firm A forms

an alliance than if it pursues independent project implementation (i.e.,  $\gamma_A > 0$ ). Consumers correctly infer that an alliance is more likely to occur if the quality of firm *A* is high than if it is low, and the announcement effect on firm *A*'s reputation is positive. Since the uncertainty about firm *A*'s quality is low, its reputation may not change much, but it will nevertheless increase.

Returning to the previous analogy with mature (or well-established) firms and non-mature (or less established) firms, this result suggests that a mature firm may have purely reputational motivations to form an alliance with a non-mature firm. Furthermore, this may be the case even if the reputation and/or the quality of the non-mature firm are relatively low. As argued above, the underlying mechanism is that an alliance with a firm that does not have a well-established reputation may be a strong signal of high quality of a mature firm.

Result (ii) of Proposition 7 indicates that the announcement of an alliance constitutes a signal of low firm quality if the firm's participation levels in the joint projects are sufficiently low and the uncertainty about the firm's quality is sufficiently high. Although this result stands in contrast with result (i), its intuition is analogous. If consumers have significant uncertainty about the quality of firm *A* and firm *A*'s participation level in project  $P_C$  under an alliance is low, the quality of firm *A* will have a greater marginal impact on future firm reputations and joint profits if firm *A* implements project  $P_C$  independently rather than jointly (i.e.,  $\gamma_A < 0$ ). Consumers correctly infer that an alliance is more likely to occur if the quality of firm *A* is low than if it is high, and the announcement effect on firm *A*'s reputation is negative.

To the extent that a high relative contribution of a firm to a joint project reflects its project-specific "resource richness", result (ii) of Proposition 7 has an interesting implication. It may be tempting for a resource-constrained firm to form an alliance with a resource-rich partner to gain access to important resources and competences like distribution channels, technology, or know-how (e.g., Stuart, 2000). However, if the resource-constrained firm is non-mature (or less established), such an alliance may constitute a double-edged sword, as its announcement may signal low firm quality, having a negative impact on the firm's reputation.

In sum, our analysis of the announcement effect shows that, in situations where firms' alliance decision is affected by reputational considerations, the announcement of an alliance may have a positive

or a negative signaling impact on a firm's reputation. Moreover, the impacts on the reputations of the different partners may have opposite signs. The announcement of an alliance signals high (low) quality of a firm if firms' incentive to engage in an alliance increases (decreases) with that firm's quality. These results imply that, in practice, reputational considerations—that is, updated inferences about firms' competence levels—can play an important role in explaining the impact of the announcement of alliances on the stock market valuations of publicly listed firms.<sup>22</sup> Furthermore, due not only to the announcement effect but also to the performance effect, mature (or well-established) vs. non-mature (or less established) firms and resource-rich vs. resource-constrained firms may have very different incentives to engage in alliances, even if they have the same underlying levels of competence and the same potential partners.

#### **4.4 Combined Impact of the Three Reputational Effects**

In essence, when non-reputational synergies are not dominant, the cumulative impact of the three identified reputational effects on joint profits will determine firms' optimal choice between an alliance and independent project implementation. As formally stated in Proposition 8 below, the combined impact of the announcement and performance effects may counter and dominate the impact of the complementarity effect and, therefore, determine the optimal choice.

*PROPOSITION 8. The combined impact of the announcement and performance effects on the choice between an alliance and independent project implementation may counter and dominate the complementarity effect, thereby determining firms' optimal choice if non-reputational synergies are not dominant.*

Fundamentally, our analysis implies that the notion of synergies in the case of reputations should be expanded to include, not only the more *static* direct combinations of firms' reputations and projects (the complementarity effect), but also the *dynamic* signaling effects of the announcement of an alliance and of project performance. Ascertaining the impact of these signaling effects is *a priori* challenging, as they are complex and endogenously determined in equilibrium. However, as hinted by Proposition 8, a

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<sup>22</sup> The announcement of an alliance may have a positive or a negative impact on the stock market valuation of a publicly listed firm. Consider, for example, Coca-Cola and Procter & Gamble's (P&G) announcement, in February 2001, of a US\$4.2 billion joint venture to develop and market juices, juice-based drinks, and snacks. Even though that joint venture did not materialize, upon its announcement Coca-Cola's stock price immediately dropped by 6 percent and P&G's stock price rose by 2 percent. The announcement effect that we identify here can be an important explanatory factor of this kind of changes in public firms' stock market valuations.

naïve or myopic perspective that focuses exclusively on the complementarity effect may lead to misguided decisions.

Despite the intricacies of the announcement and performance effects, our analysis provides insights about the relative importance of the different reputational effects. To a large extent, their relative importance depends on the precision of consumers' perceptions of firms' qualities (or competence levels). If consumers face little uncertainty about the qualities of both firms—for instance, because both firms are mature (or well-established)—the complementarity effect typically dominates, as the signaling impacts of the announcement of an alliance and of project performance are likely to be negligible. In contrast, if there is substantial uncertainty about the quality of at least one of the two firms, the announcement and performance effects tend to be particularly important. The relative importance of the different reputational effects also depends on the extent to which firms' reputations differ. If firms' reputations are similar, the complementarity effect fades, and the other effects are more likely to take center stage.

## **5. Discussion**

The corporate strategy literature identifies several motivations for firms to form alliances, such as combining different complementary resources and capabilities, efficiency improvements, or increasing market power (e.g., Porter and Fuller 1986, Kogut 1988, Oliver 1990, Gomes-Casseres 1997, Dyer and Singh 1998, Wang and Zajac 2007, Capron and Mitchell 2012). This paper contributes to this literature by underscoring that one cannot fully evaluate the value-creating potential of alliances without considering explicitly their reputational implications, and by showing that reputational considerations may be an important driving force behind alliance formation decisions. In our model, we identify situations where non-reputational synergies in an alliance are limited (or nonexistent), but nonetheless firms may have the incentive to collaborate due to reputational synergies. We also identify situations where, even though non-reputational synergies would, in and of themselves, give firms the incentive to form an alliance, independent project implementation may be optimal due to reputational considerations.

Our results also have important implications for the scholarly literature that focuses on partner selection in alliances (e.g., Geringer 1988, Shah and Swaminathan 2008). Our discussion of possible equilibrium configurations implies that, if the objective is to maximize the incremental joint profits

obtained through an alliance, a firm may prefer a low-quality partner to a high-quality partner. Similarly, and perhaps more importantly in the context of this paper, the analysis of the complementarity effect reveals that, from the standpoint of firms' joint profits, a high-reputation partner is not necessarily preferable to a low-reputation partner. This result, which goes against conventional wisdom (Dollinger et al. 1997, Stuart et al. 1999, Gu and Lu 2014), mainly reflects the application of a dyadic (or multi-sided) perspective that focuses on maximizing firms' joint profits, thereby considering the impact of an alliance on the reputations and projects of *all* firms.

Furthermore, the discussion of the announcement effect complements established sociological status-based arguments on partner selection. These arguments purport that the status of an entity is positively influenced by the evaluations of its partners.<sup>23</sup> Associations with highly regarded partners are typically seen as beneficial for an entity (e.g., Merton 1968[1973], Podolny 1994), because they function as endorsements of that entity's quality. This happens since highly regarded partners are likely to be both selective about the entities that they associate themselves with, and reliable evaluators of the qualities of those entities. Applying these arguments to strategic alliances, several authors point out that alliances are signals that commonly enhance firms' social status, recognition, or legitimacy (e.g., Oliver 1990, Stuart 2000, Dacin et al. 2007). In the context of our paper, this "endorsement" mechanism would suggest that an association with a high-reputation partner has a positive impact on a firm's reputation. Interestingly, our analysis of the announcement effect implies that this is not necessarily the case: implementing a project with a high-reputation partner does not necessarily signal a high firm quality (or competence). This is so because a high-quality firm may benefit more from implementing the project independently rather than jointly, even if its potential partner has a high reputation. In such cases, collaborating with a high-reputation partner may signal a low firm quality, having a negative impact on the firm's reputation.<sup>24</sup>

The existing literature on how firms' reputations affect their alliance activity largely focuses on reputation as a signal of firm quality (or level of competence) to potential partners (Dollinger et al. 1997,

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<sup>23</sup> Reputation and status can be interpreted as distinct but related signals of quality. Whereas reputation is more akin to an *absolute* expectation of an entity's quality given its prior actions, status is closer to the expectation of an entity's placement in a socially constructed *ordering* or *ranking* of quality (e.g., Merton 1957, Stern et al. 2014).

<sup>24</sup> These results about partner selection hold, not only when the decision of whether to form an alliance is determined by reputational effects, but also when non-reputational synergies are dominant. As such, they reinforce the idea that reputational considerations may be relevant in a wide range of situations.

Stuart et al. 1999, Gu and Lu 2014, Stern et al. 2014). In contrast, we focus on reputation as consumers' perceptions of firm quality. The formalization of reputation as a signal of quality to potential consumers provides a very natural and intuitive avenue to discuss the different reputational effects. This modeling choice may also be justified by the fact that prospective alliance partners typically conduct some form of due diligence to evaluate each other's characteristics with a significant level of accuracy, and therefore are likely to be better informed about each other than external stakeholders (such as consumers).

It is important to note, however, that most of our results still hold if firms' reputations are signals of their qualities (or levels of competence) to stakeholders other than consumers. Consider, for example, that we formalized a firm's reputation as a signal of its quality to other potential partners beyond a focal alliance. This would imply three main changes in the specification of the model. First, firms' joint profits would have to include parameters corresponding to each firm's expected profits from possible future alliances with other potential partners. Those parameters, which would capture the opportunity and need mechanisms discussed in the literature, would depend on firms' reputations *vis-à-vis* other potential partners (i.e., other potential partners' perceptions of firms' qualities). Second, the announcement and performance effects would correspond, respectively, to the impact of the announcement of an alliance and of project performance on other potential partners' perceptions of firms' qualities. Finally, if we assumed for simplicity that consumers have no uncertainty about the qualities of firms and their projects (and their associated products), the complementarity effect would be the direct impact of the alliance on firms' joint profits through the combination of firms' *qualities* and projects. With this alternative formalization, the result that reputational synergies may give firms the incentive to engage in alliances even if no other motivation to collaborate exists, the findings about the relevance of the announcement and performance effects, and the idea that the desirability of a partner does not necessarily increase with its level of competence would still apply. In contrast, the result that a high-reputation partner is not necessarily preferable to a low-reputation partner—which follows directly from the complementarity effect in our model—crucially depends on the assumption that reputation is a signal of quality to potential consumers. If this is not the case, the complementarity effect simply provides an additional mechanism that reinforces the idea that a high-quality partner is not necessarily preferable to a low-quality partner.



Within strategy and management, the interest on reputation as a source of value creation cannot be dissociated from the resource-based view (RBV) of the firm, which emphasizes the role of *valuable*, *non-tradable*, *non-imitable*, and *non-substitutable* resources as fundamental for sustainable competitive advantage and above-normal returns (e.g., Penrose 1959, Wernerfelt 1984, Barney 1986, Dierickx and Cool 1989, Peteraf 1993). Arguably, firm reputation entails these abstract “canonical” characteristics (e.g., Barney 1991). Furthermore, firm reputation has some distinctive features as a resource that are directly related to the dynamic signaling effects uncovered in our model (i.e., the announcement and performance effects). First, in the case of reputation, accumulation and deployment processes are closely *intertwined*. A firm associates its reputation to a given project by participating in that project’s implementation. Furthermore, the firm’s reputation may evolve based on the observation of both its decision to participate in the project and the project’s performance.<sup>25</sup> Second, as an “information-like” resource, reputation is typically considered to be not only significantly *fungible*, that is, it may be deployable or applicable across a wide range of projects, but also *scale free*, that is, its use across different projects is non-rivalrous (e.g., Winter and Szulanski 2001, Bryce and Winter 2009, Wu 2013). Scale free resources are immune from an opportunity cost logic because their deployment to one project does not impair the value of their deployment to another project. Thus, scale free resources can simply be *shared* across projects, and concerns about their redeployment from one project to another are not pertinent (e.g., Levinthal and Wu 2010, Sakhartov and Folta 2014). However, the idea that reputation is a scale free resource overlooks the announcement and performance effects. As a result of these dynamic signaling effects, the deployment of a firm’s reputation to a given project may, in and of itself, reduce the value of that reputation and thereby impair its deployment to other projects. Echoing these arguments, Levinthal and Wu (2010: 781, footnote 3) explicitly acknowledge that a firm’s reputation may not be entirely scale free.

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<sup>25</sup> Resource accumulation and deployment processes may also be intertwined in the case of some innovations and capabilities. This is so because innovations and capabilities may also be developed, not only through R&D activities or other investments, but also through learning-by-doing processes. However, in the case of firm reputation, the mechanisms that drive the relation between deployment and accumulation processes are different: they result from inferences made about the firm that stem from the announcement of the firm’s projects and from the performance of those projects.

Although the definition of alliances in our model is quite general, our analysis did not consider the reputational implications of the choice between different types of alliances. In the e-companion to the paper, we explore this aspect by extending our model to analyze how reputational considerations may affect firms' choice of alliance scope.<sup>26</sup> To do so in an analytically tractable way, we compare two extreme situations: a *narrow alliance*, where firms collaborate in the implementation of a single project, and a *wide alliance*, where firms collaborate in the implementation of all their projects. Although the assumption that firms jointly implement all their projects in a wide alliance may be extreme, it establishes a clear contrast with a narrow alliance, providing a convenient benchmark to analyze the impact of reputational considerations on firms' alliance scope choices.<sup>27</sup> We find, for example, that the complementarity effect makes a wide alliance more likely to be preferred to a narrow alliance when one firm has a high reputation and the other firm has valuable projects. Quite intuitively, this result highlights that a greater potential for synergistic complementarities between firms' reputations and projects promotes a greater scope of collaboration. In line with our main analysis, we also show that the impact of the announcement and performance effects on the choice between a narrow and a wide alliance may counter and dominate the complementarity effect and, therefore, should not be ignored.

Notwithstanding its framing in terms of alliances, the above discussion on alliance scope may also capture some of the differences between the reputational implications of mergers and acquisitions (M&As) and alliances. An important difference between these two governance modes is that, since M&As typically entail a greater degree of integration of the firms' organizations, they conceivably involve a greater scope of collaboration between those organizations. Specifically, in our model extension a merger or an acquisition may be approximated by the situation referred to above as a wide alliance, and the foregoing comparison between a wide and a narrow alliance may also capture important features of

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<sup>26</sup> The existing literature on alliance scope largely emphasizes how the scope of collaboration in an alliance may affect the tension between firms' incentives to exchange knowledge to achieve the alliance's objectives and their incentives to learn to attain their own private goals (e.g., Khanna 1998, Khanna et al. 1998, Baum et al. 2000, Oxley and Sampson 2004, Lunnan and Haugland 2008). Rather than addressing this tension between common and private benefits, in the extension of our model we follow the same approach as in the main analysis, focusing on the impact of the scope of the alliance on firms' joint profits.

<sup>27</sup> As an example of a narrow alliance, consider again the partnership between Huawei and Leica to collaborate in the development of phone photography technology. A wide alliance can be illustrated by the 1999 cross-shareholding agreement between Renault and Nissan, which yielded synergies in multiple areas, such as the joint development of engines, platforms, batteries, and other key components.

how reputational implications affect firms' choice between M&As and alliances.<sup>28</sup> Broadly, the literature on firms' choice between these two governance modes identifies several factors that may influence that choice, such as information asymmetries between firms, non-separability of the desired complementary resources and capabilities from firms, appropriability risks, management and integration costs, and legal or institutional barriers (e.g., Hennart 1988, Balakrishnan and Koza 1993, Dyer et al. 2004, Villalonga and McGahan 2005, Wang and Zajac 2007, McCann et al. 2016). To the extent that our analysis of the scope of collaboration captures relevant elements that distinguish M&As and alliances, our results complement the existing literature by emphasizing that the choice between these two governance modes should also consider complementarities between firms' reputations and projects and, perhaps most importantly, the reputational implications stemming from the announcement of the decision and from project performance.

This paper is also related to the economics literature on the dynamics of reputation formation and evolution (e.g., Klein and Leffler 1981, Kreps and Wilson 1982). This literature largely focuses on projects developed by a single entity. There are, however, some exceptions, such as the articles by Jeon (1996) and Bar-Isaac (2007) on reputation formation in teams of individuals, and the article by Almeida Costa and Vasconcelos (2010) on the reputational implications of partnerships to develop a new project.<sup>29</sup> Our analysis complements those articles in several ways. First, the focus of our model is on projects that firms may either implement independently or jointly, which allows us to contrast the reputational implications of independent project implementation and alliances. Second, the fact that we analyze a broad range of alliances—by not imposing any restrictions on the number of jointly implemented projects and on firms' participation levels therein—allows us to provide a comprehensive view of their

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<sup>28</sup> Of course, even in the case of a merger or an acquisition, the firms' organizations may not implement all their projects jointly. For example, following the acquisition of Whole Foods by Amazon in 2017, the two organizations retained a significant level of autonomy. Thus, the assumption that under a merger or an acquisition all the projects are implemented jointly by the firms' organizations does not necessarily hold. Independently of the specific operationalization of the scope of collaboration (measured in our model as the number of jointly implemented projects) under a merger or an acquisition and under an alliance, the main point here is that the scope of collaboration is conceivably greater under the former type of governance mode.

<sup>29</sup> Given that we formalize reputations as signals of firms' qualities to consumers, another (more indirectly) related literature to our paper is the one on brand alliances within marketing (e.g., Park et al. 1996, Simonin and Ruth 1998, Rao et al. 1999). Brand alliances can be broadly defined as situations where two or more brand names are presented jointly to consumers. This literature shows empirical evidence that combining two or more brands may enhance consumers' quality perceptions of a given product (Park et al. 1996, Rao et al. 1999)—comparably to the complementarity effect—and that consumers' attitudes toward a brand alliance have spillovers on their subsequent attitudes toward the partnering brands (Park et al. 1996, Simonin and Ruth 1998)—akin to the announcement and performance effects. Hence, our game-theoretic analysis contributes to this literature as well.

reputational implications. Third, we explicitly consider that firms may have non-reputational motivations to form alliances and examine the reputational implications of an alliance both when such motivations determine the firms' decision and when they do not. Finally, by identifying and characterizing the three cumulative reputational effects associated with firms' decision to form an alliance—the complementarity effect, the performance effect, and the announcement effect—, we provide a conceptual framework that contributes to a better understanding of the reputational implications of alliances and that could be useful to managerial practice.

## **6. Conclusion**

In this paper, we develop an adverse selection game-theoretic model to analyze how reputational considerations affect firms' incentives to form alliances. Formal models are useful to study complex topics like this one, as they force us to define abstract concepts and relationships in precise terms and allow the identification of intricate mechanisms, whose nuances and boundary conditions may not be immediately apparent. In particular, our model allows us to isolate and characterize three cumulative reputational effects—the complementarity effect, the performance effect, and the announcement effect—and to discuss how their interplay may influence firms' decision to form an alliance.

Our analysis suggests some interesting opportunities for future research. First, it may be worthwhile to develop a formal model of the reputational implications of alliances that explicitly incorporates value appropriation concerns by firms. In our model, we largely abstract from these considerations by assuming that firms can transfer surplus between themselves without frictions and, as a result, their objective is to maximize joint profits. Nonetheless, research on alliances indicates that value appropriation concerns can have a significant influence on the formation and functioning of alliances (e.g., Khanna et al. 1998, Kale et al. 2000, Shah and Swaminathan 2008, Adegbesan and Higgins 2011). Second, the impact of reputational considerations on partner search and matching processes seems to be another potential avenue for formal research (for a related analysis, see Cabral and Pacheco-de-Almeida 2019). Given our specific theoretical focus, our model does not address partner search and matching processes, by assuming that the pair of firms that face the opportunity to form an alliance is exogenously defined. This assumption contrasts, for example, with standard assumptions in network theory about the

endogenous emergence of organizational networks (e.g., Gulati and Gargiulo 1999). Finally, our results also bring forth implications that are amenable to empirical testing. For example, it is likely that reputational synergies between firms will be a stronger predictor of alliance formation when other types of synergies are weaker. In such situations, alliances between firms with disparate reputation levels may be more synergistic (and therefore more prevalent) than alliances between firms with similar reputation levels (e.g., two high-reputation firms). Moreover, the announcement of an alliance and the performance of joint projects may have a significant impact of firms' reputations. The sign and magnitude of these effects may vary depending on whether one considers mature (or well-established) *vs.* non-mature (or less established) firms or resource-rich *vs.* resource-constrained firms.

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## Appendix: Figures

Initial Conditions	Period Zero	Period One	Period Two
<ul style="list-style-type: none"> <li>- Firm <math>i = A, B</math> has a quality <math>q_i \in [0,1]</math> and an initial reputation <math>r_i \in [0,1]</math>.</li> <li>- Firms have projects <math>P_j</math> with <math>j \in \{A, B, C\}</math>. Projects <math>P_A</math> and <math>P_B</math>, which belong respectively to firm A and firm B, start in period two. Project <math>P_C</math>, which belongs to firm A, starts in period one (and continues in period two).</li> </ul>	<ul style="list-style-type: none"> <li>- Firms decide (decision <math>d</math>) to implement their projects either independently or jointly, through an alliance (<math>d \in \{I, J\}</math>).</li> <li>- After firms' decision <math>d \in \{I, J\}</math> is observed by consumers, firm <math>i</math>'s reputation is updated to <math>r_i^d \in [0,1]</math> (interim reputation).</li> </ul>	<ul style="list-style-type: none"> <li>- Project <math>P_C</math> is implemented and its performance outcome (<math>\varphi</math>) is revealed: either a failure or a success (<math>\varphi \in \{f, s\}</math>).</li> <li>- Depending on the performance of project <math>P_C</math> and on firms' decision <math>d</math>, firm <math>i</math>'s reputation is updated to <math>r_i^d(\varphi) \in [0,1]</math> (ex-post reputation).</li> </ul>	<ul style="list-style-type: none"> <li>- Projects <math>P_A, P_B</math>, and <math>P_C</math> are implemented.</li> </ul>

Figure 1 Timing of the Model and Main Parameters

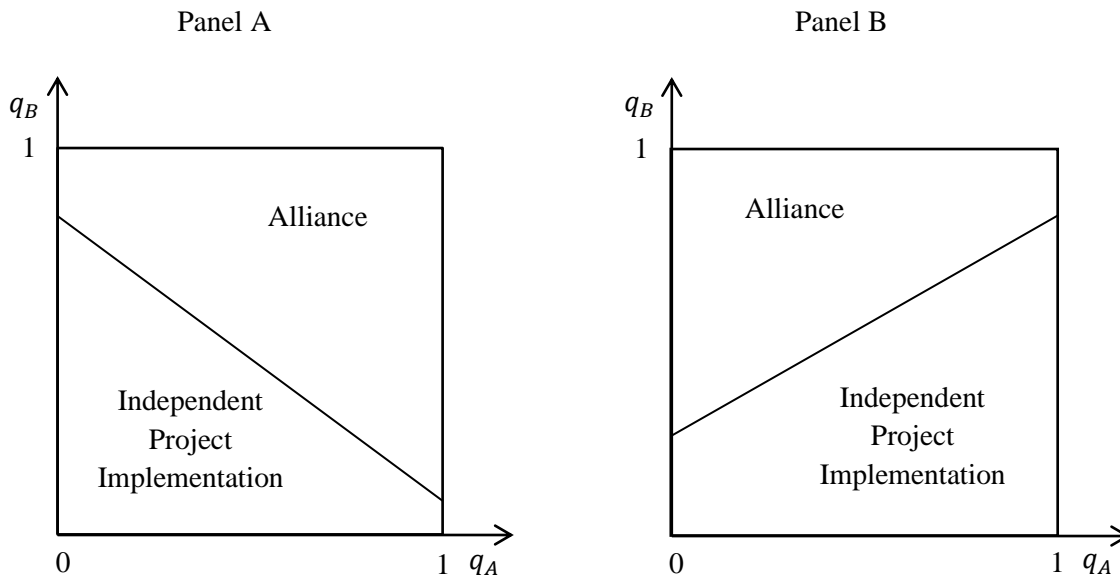


Figure 2 Equilibrium Configurations where Independent Project Implementation and an Alliance Occur for Different Firm Qualities