

NGOs and the creation of value in supply chains

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Research Summary: Firms and nongovernmental organizations (NGOs) often collaborate to establish new supply chains. With a formal model, we analyze how NGOs can alleviate market failures and improve supplier economic inclusion while strategically interacting with firms. We account for the specific goals of the NGO and the need to induce collaboration between firms and their suppliers. The analysis reveals a “valley of frustration,” when NGO efforts benefit all actors but only marginally the firm. We also show that more powerful firms might prefer to internalize NGO functions, while firms with lower bargaining power and higher investment requirements are better off collaborating with NGOs. Finally, we study NGOs-firms matching patterns and find that firms with higher bargaining power match with NGOs holding stronger capabilities.

Managerial Summary: This article analyzes interactions between firms and nongovernmental organizations (NGOs) aiming to improve the economic inclusion of suppliers or to promote the adoption of specific (e.g., sustainable) practices. For firm executives, this study shows the constraints and benefits associated with working with NGOs, the conditions under which integration of NGO functions is preferable as well as the types of NGOs that offer better prospects for a successful collaboration. For NGO executives, it highlights the need to provide enough economic incentives to firms and suppliers alike to ensure their collaboration and the trade-offs associated with this constraint, in particular, if NGO capabilities are limited. Overall, the study provides a comprehensive understanding of how NGO activities can influence value creation in a vertical value chain.

KEY WORDS

firm-NGO collaboration, nongovernmental organizations (NGOs), nonprofit, value creation

1 | INTRODUCTION

Interactions between firms and nonprofit actors are a prominent feature of the modern economy. In particular, nonmarket corporate strategy often deals with managing relationships with nonprofit actors. A famous example is the collaboration between Starbucks and the nonprofit Conservation International in 1998, where Conservation International trained farmers in the Mexican region of Chiapas to produce sustainable shade-grown coffee, which was bought by Starbucks (Austin & Reavis, 2002). More recently, in 2007, Unilever partnered with the nonprofit Rainforest Alliance to make its Lipton tea brand fully sustainable, which involved developing the skills of local suppliers so that they could meet Unilever's standards (Henderson & Nelleman, 2011). In another example, in Mozambique, SABMiller—the world's second largest brewer—launched a beer based on locally sourced cassava root with the help of the nonprofit IFDC, which provided support and assistance to local farmers regarding agricultural practices (Parmigiani & Rivera-Santos, 2015).

In all these cases, a nonprofit or nongovernmental organization (NGO) collaborated with a firm to help suppliers change their practices, resulting in increased economic inclusion for the suppliers and a more valuable final product for the firm and its customers. These collaborations between NGOs and firms are leading examples of situations where economic value creation through commercial activities, and the resulting changes in supply chains, are influenced by NGO activities undertaken in concert with for-profit actors. In spite of the importance of this phenomenon, a clear articulation of how value creation by firms and their suppliers is influenced by NGO activities is still lacking. Extant research has made great strides studying how NGOs foster economic value creation (McDermott, Corredoira, & Kruse, 2009) and how NGOs and firms interact strategically (Baron & Diermeier, 2007), but there is little analytical work combining both viewpoints and examining how value creation by firms and their suppliers can be facilitated by NGOs pursuing their goals.

In this article, we examine the interactions between firms and NGOs (nongovernmental organizations) forming partnerships to include new suppliers in a supply chain. These partnerships bring together a profit-seeking firm that wants to source a differentiated input and an NGO who is interested in facilitating the access of hitherto isolated supplier to a commercial supply chain. The NGO's goal can be directly related to helping as many suppliers as possible, or indirectly, to ensure a change of practices (e.g., environmentally related) within the population of suppliers. We show how interactions between these actors influence economic value creation as firm and supplier interests both enable and constrain NGO activities, giving rise to important trade-offs. We draw strategic implications for firms seeking to enter such partnerships.

Our article makes three main contributions to our understanding of strategic interactions between firms and NGOs. First, we elucidate the trade-offs an NGO makes to ensure the firm captures enough value while fulfilling its mission. We characterize the conditions under which the NGO decides to create enough inducement to make the firm include new suppliers into its supply chain. However, we also show that for a range of parameters (the "valley of frustration"), the firm enjoys only a minimal additional value capture, creating the paradox of a large change of supply chain structure for little tangible improvement in the bottom line. Our analysis suggests that such "valley of frustration" is not a bug, but a feature of collaboration with NGOs that firms need to fully account for.

Second, we characterize a firm's choice between collaborating with an NGO and integrating the supplier improvement functions of the NGO. We show that even though collaborating with an NGO can be an attractive proposition outside of the "valley of frustration" as the firm effectively shifts the costs of supplier development to the NGO, a firm may nevertheless prefer to integrate activities that

the NGO is undertaking to better align incentives. This happens when the firm captures a large part of the value created and has supplier development capabilities comparable to those of the NGO.

Third, we study the outcome of competition between firms and NGOs to find the best partner. We investigate the stable competitive matchings between firms and NGOs given their characteristics and preferences in our model. We show that competition to form the better matches gives rise to a positive correlation between a firm's bargaining power and an NGO's efficiency among matched pairs of firms and NGOs, which are themselves split into two separate clusters. Moreover, these correlations are negative within clusters, suggesting that empiricists should be very careful about interpreting observed correlations between the characteristics of firms and NGOs that are collaborating.

These results contribute to our understanding of the tensions between value capture and value creation in partnerships between for-profit firms and nonprofit actors. For-profit entities such as firms invest in value creation capabilities only if they expect enough value capture. Nonprofit entities (e.g., NGOs) can, in turn, frame for-profit behavior by influencing value creation and capture possibilities. Furthermore, this article deepens our understanding of the interdependence of private organizations (firms and NGOs), which have different objectives (for-profit vs. nonprofit), but nevertheless work together to create economic and social value (Mahoney, McGahan, & Pitelis, 2009).

We use methods from game theory and value-based strategies (Brandenburger & Stuart, 1996, 2007) to study this tension, distinguishing between economic value that is transferable among for-profit actors and nontransferable value that is subjective to nonprofit actors. Thanks to this, we can formally and rigorously analyze interactions among stakeholders who care for different types of value (economic vs. social). By doing so, we provide an analytically tractable answer to recent verbal contributions that highlight how value is differently appreciated and created by stakeholders (Bridoux & Stoelhorst, 2014; Garcia-Castro & Aguilera, 2015; Tantalo & Priem, 2016).

2 | THEORETICAL BACKGROUND AND POSITIONING

2.1 | Nonprofit sector literature and firm-NGO collaborations

This research comes against the backdrop of a significant literature that has followed and studied the emergence of institutions belonging to the nonprofit sector. This sector comprises formal, independent organizations that are distinct from the government, do not distribute profits, rely on voluntary participation (Salamon & Anheier, 1992), and fulfill a public or community-related purpose (Salamon & Sokolowski, 2016). In this article, we call NGOs any organization that fulfills these criteria.

A large part of that literature has studied how and when nonprofit organizations establish collaborations with for-profit organizations. In particular, Austin (2000a, 2000b) argued that the collaborations can be located on a continuum from "Philanthropic" to "Integrative" with an intermediary "Transactional" Stage. The "Philanthropic" Stage is one of low engagement and interactions between partners, with a relationship effectively confined to a limited transfer of monetary resources in return for reputational benefits. At the other end of the spectrum, the "Integrative" Stage is one of full alignment of goals, broad scope, and major strategic value (Austin, 2000a).

Our study is better understood as set in the intermediary "Transactional" Stage. There, the relationship between the firm and the NGO is complex enough in that it involves frequent interactions and coordination, bilateral exchange of resources and services, and is of significant strategic value to the firm. Even if monetary transfers are involved, they only occur to support more coordinated activities. However, the firm's goals are still not aligned with the mission of the NGO, and the

organizations remain separate, making the collaboration fall short of being “Integrative.” “Cross-sector” partnerships of this type, between nonprofit and business, are typically considered to be integral part of firms’ CSR strategy (Seitanidi & Crane, 2009).

2.2 | Cross-sector partnerships in the management literature

These partnerships have also been studied by the management literature (Selsky & Parker, 2005; Wassmer, Paquin, & Sharma, 2014). They can involve complex relationships that create new supply chains bringing actors that were previously excluded from the market (e.g., consumers at the “base of the pyramid” in Parmigiani and Rivera-Santos (2015) and Perez-Aleman and Sandilands (2008)). They can also enable the development of new capabilities (McDermott et al., 2009; Gatignon & Capron, 2016) and business models (Dahan, Doh, Oetzel, & Yaziji, 2010) that are crucial for value creation. Our article relates to these works by focusing on how an NGO works to facilitate supplier access to a supply chain by improving the suppliers’ capabilities and by explicitly incorporating value creation and value capture concerns in the decision making of the agents.

Our article thus contributes to recent frameworks guiding the organization of these partnerships stemming from the nonprofit literature (e.g., Al-Tabbaa, Leach, & March, 2014; Austin & Seitanidi, 2012) and the management literature (e.g., Berger, Cunningham, & Drumwright, 2004; King, 2007; Rivera-Santos, Rufin, & Wassmer, 2017; Rondinelli & London, 2003).

Some important contributions (Bodewyn & Doh, 2011; Rangan, Samii, & Van Wassenhove, 2006) have studied the entire gamut of make-buy-ally arrangements between firms and NGOs for the provision of social goods, while others have studied each organizational form’s comparative advantage in this respect (Kaul & Luo, 2015). Even though our article speaks narrowly to the make versus ally decision, a key difference is our focus on enabling economic value creation in a commercial supply chain rather than the special case of the provision of social goods.

2.2.1 | Public-private partnerships and the economics of regulation

A different stream of literature in management studies has also looked at public-private partnerships. Such studies typically seek to understand how governments structure partnerships with private firms in order to achieve their goals by tapping into private sector capabilities (Kivleniece & Quélin, 2012; Quélin, Kivleniece, & Lazzarini, 2017) and developing their own contract management capabilities (Brown & Potoski, 2003; Cabral, Lazzarini, & de Azevedo, 2013). More generally, they draw on classic works in the economics of regulation of businesses by governmental agencies (e.g., Laffont & Tirole, 1993).

While we do not include government in the scope of our study, we nevertheless draw from the assumptions and logic of these works. Specifically, we see NGOs as strategic actors (like governments) that understand that they have to provide sufficient incentives to get profit-seeking firms to behave in a way that is compatible with their objectives. Specifically, private firms need to be made better off by participating and their participation constraint satisfied.

However, there is a significant difference. In the classic economics of regulation (Laffont & Tirole, 1993), government seeks to maximize welfare, giving equal weight to firm profits and consumer surplus. In our model, the objective function of the NGO does not easily map into that of a regulator. For one thing, the NGO gives no weight to firm profit beyond making sure the firm is incentivized to collaborate. For another, the NGO does not maximize the value capture of suppliers. Instead, it wants to maximize the probability that a supplier is given access to the supply chain.

2.2.2 | Private politics and stakeholder management

Our article relates directly to the political economy approach to relationships between NGOs and firms (Baron, 2012; Baron & Diermeier, 2007) in its use of game theory to model NGO behavior. The biggest difference is that we posit that the NGO can help the firm do business, and as a result, help the NGO's constituency (e.g., suppliers), rather than seeking to alter the firm's behavior thanks to the use of carrots and sticks such as activist campaigns. While methods are different, the same remark applies to the sociological work studying activist campaigns against firms (e.g., McDonnell & King, 2013; McDonnell, King, & Soule, 2015). Our article seeks to explore the collaboration side of firm-NGO partnerships, and does this by bringing into the model the economic value that the firm could be creating thanks to the efforts of the NGO, even though the firm and NGO goals are not fully aligned.

Beyond the particular case of firm-NGO relationships, this article is also an example of stakeholder management that blurs the boundary between market and nonmarket strategy (Dorobantu, Kaul, & Zelner, 2017). In our model, the NGO is engaged in arm's-length relationships with the firm that leverage the firm's bargaining power (Bridoux & Stoelhorst, 2014), while the firm reaps the benefits from its engagement with the NGO (Dorobantu & Odziemkowska, 2017; Henisz, Dorobantu, & Nartey, 2014) by capturing value in the market place. Firm-NGO ties thus enable capture of value in the product market, in a way reminiscent of the economic role played by other types of embeddedness (e.g., Rangan & Sengul, 2009).

2.2.3 | Methods and roadmap

Our article seeks to bring together in a unified model NGOs, firms, suppliers, and the economic value created among these. We build on the strategic and game-theoretical approach that has focused on competition and conflict between NGOs and firms (e.g., Baron & Diermeier, 2007). We apply elements of that framework to the question of the collaboration between these actors and embed it in a supply chain where firms and their suppliers care about value creation and value capture (Brandenburger & Stuart, 1996). By doing so, we can focus on the perspective of an NGO seeking to strategically collaborate with for-profit firms and facilitate the creation of economic value. We can also neatly distinguish between economic value that matters to for-profit stakeholders, and subjective (nontransferable) value that matters to nonprofit stakeholders.

We model a strategic interaction between an NGO and a firm where the NGO's goal is to increase the economic inclusion of agents that are potential suppliers of a firm. The goals of the NGO, of the suppliers, and of the firm diverge but are not fully antagonistic, creating the possibility of collaboration. At the same time, the environment for the collaboration is fully dependent on the creation of economic value in a vertical chain, which means that contributing to economic value creation is a necessary ingredient to the NGO's ability to meet its ultimate goals. Using this game theoretical model, we bring to light the mechanisms relating the NGO's behavior to the fundamentals of value creation in a vertical chain, including potential in value creation, the NGO's capability and relative bargaining power among firms and suppliers.¹ We investigate the trade-offs NGOs are willing to accept or to impose in order to achieve their goals under the constraints of the participation of the other economic actors. In particular, we can answer the following questions: What are the market characteristics that are conducive to collaborations between firms and nonprofit organizations? What is the strategy adopted by a nonprofit in such cases? When does the firm benefit from integrating NGO's activities versus partnering with the NGO? Which pairings of firms and nonprofits should we

¹In online Appendix H in File S1, we offer a table contrasting our article with related literatures.

expect to observe given their characteristics and the characteristics of the market exchange environment in which they are embedded? Which empirical patterns should we expect to observe?

Section 3 describes and analyzes the base model. Section 4 extends the base model and provides the firm with the option to internalize the activities of the NGO. Section 5 analyzes the preferences of firms and NGOs over their partner's characteristics. Section 6 draws the implications for the expected matching patterns. In Section 7, we summarize several extensions and generalize some key results. All proofs and supplementary analyses are in the online appendices.

3 | MODEL

To facilitate exposition, we describe the model in two steps. In the first step, our goal is to establish sound foundations rather than immediately show new results. We do this with a model without NGO where value is created between a firm and a supplier whose value creation abilities are uncertain. Both sides need to invest before knowing the actual value that can be created, resulting in a situation in which neither side can fully capture the returns from its investment, producing a classic result of underinvestment compared to the first best outcome (i.e., the outcome that maximizes welfare). In the second step (Section 3.4), we build on these premises and include in the model an NGO that is able to increase the opportunities for value creation between the firm and the supplier.

3.1 | Model setup without an NGO

We start with a model comprising only two players: a firm and a supplier that we denote as F and S , respectively. All players are risk-neutral. The firm and the supplier can each make an investment, I_F and I_S , respectively. If both invest, they can together make one unit of a product creating value v downstream. Buyers are assumed to be identical and numerous. Investments I_F and I_S are sunk and worthless outside of the relationship. I_F represents the specialized investment made by the firm to transform, distribute, and market the product for which it needs the supplier's input. I_S represents the specialized investment made by the supplier in order to produce an input that is valuable to the firm. We assume a one-off interaction. The game can thus be thought of as unfolding over a period of time corresponding to a crop season without repetition.

3.1.1 | Contractibility and informational assumptions

In our model, unless otherwise mentioned, investments by the firm and the suppliers, and effort by the NGO are not contractible.² Moreover, as will be further explained in a following section, the quality of the input that will be produced by the supplier is unknown before investments are sunk, including by the supplier, either because of true uncertainty about this quality or because the exact type of the supplier is unknown. However, the probability distribution of the quality (or equivalently, of the types) is common knowledge.

3.1.2 | Quality of differentiated supplier's input is unknown ex ante

If both investments are made, the quality of the supplier's input remains uncertain, and the value created v is a draw from a uniform probability distribution $\mathcal{U}(0, \bar{V})$, where \bar{V} is the maximum value that can potentially be created with the supplier, and 0 the minimum value creation. The value creation v

²For expositional convenience, we later assume that the investment of the supplier is contractible (but not the quality outcome) so that the burden of the investments can be entirely transferred to the firm.

is the difference between the buyer's willingness-to-pay in the downstream market and the opportunity cost for the supplier.

The probability distribution over v can be interpreted as the result of uncertainty about the quality that is unknown to both players *ex ante*. For instance, weather conditions may impact the quality of crops: A recent example is Nestle's struggle with the supply of premium robusta coffee after heavy rains impeded the production of Vietnamese suppliers, resulting in the impaired quality of the beans (Reuters, 2017). Similarly, suppliers may be unsuccessful in their efforts to meet quality standards developed by the firm because of a lack of knowledge. For example, Sue Mecklenburg, former Director for Environment and Community Affairs at Starbucks, commenting on the collaboration with coffee farmers, said: "Many producers of coffee [...] never taste their coffee. They don't roast it. They don't drink it. And even if they were to taste it, they don't have any idea what we'd be looking for on this end. So they lack information about what the market's expecting" (Austin & Reavis, 2002, p. 11). In this case, the NGO's role is to provide the relevant information to the suppliers. Otherwise, uncertainty about v is compatible with some information asymmetry: the firm does not know the quality of the supplier, but only the distribution of quality in the population, and the supplier is unable to credibly convey its own type to the firm.

Alternatively, the model can be interpreted as representing a firm facing a unitary mass of small suppliers (see, e.g., Chatain & Zemsky, 2011) whose types are uniformly distributed. Due to information incompleteness, the firm does not know the type of each supplier and the suppliers cannot convey (or do not know themselves) their type, which is only revealed after investment. Then, the uncertainty is about the type of the suppliers. In both cases, firms and suppliers may be reluctant to invest in the collaboration *ex ante* because the uncertainty about the quality diminishes the expected return from the investment.

3.1.3 | Value created with undifferentiated input is constant and known *ex ante*

Instead of procuring the input from the supplier, the firm also has the outside option to create value without the supplier S . This may be the value created by the firm on its own, or with alternative suppliers of known reliability (which are in excess supply). For instance, a supermarket that is willing to resell organic fruits can have an outside option of working with industrial suppliers and selling nonorganic fruits. This outside option creates an amount of value normalized to 1.

We make the simplifying assumption that the value of the outside option (i.e., the value created and the structure of the market for undifferentiated good) is not directly or indirectly affected by what is happening in the differentiated segment. We also assume that this value is certain. This permits us to focus on the mechanisms operating around the action of the NGO in holding downstream market competition constant. Both assumptions could be relaxed in future work seeking to explore the full interactions between upstream and downstream competitive actions as in Chatain (2014).

The supplier has no outside option apart from its collaboration with the firm (or alternatively, has an outside option whose value is normalized to 0). We set $\bar{V} > 1$, that is, the potential maximum value creation with the supplier S is higher than the firm's outside option (otherwise the firm would never invest in the collaboration with the supplier).

When $v > 1$, we can interpret it either as a product which commands a higher willingness-to-pay from the consumers in the downstream market, than the firm's outside option, or as a product which has lower cost than the firm's outside option, or both. We should also note that both the willingness-to-pay and the cost may be higher than the firm's outside option, but as long as the increase in the willingness-to-pay is higher than the increase in the cost the product will create a higher value than the firm's outside option. Organic fruits are a good illustration: The cost is higher than that of

industrial fruits (e.g., due to the use of natural fertilizers, the need to restore vegetation, efforts to prevent soil erosion, etc.), but the willingness-to-pay is also higher as the consumers perceive organic fruits to be of a higher quality.

3.1.4 | Stages of the game

Summarizing the preceding information, the game thus unfolds in three stages:

Stage 1. The firm F and the supplier S simultaneously decide whether to invest I_F and I_S respectively in order to create a product.

Stage 2. Nature draws the quality of the input produced by the supplier S as a random draw v from a uniform distribution $\mathcal{U}(0, \bar{V})$, $\bar{V} > 1$. The value of the draw is revealed to the players. If both the supplier S and the firm F have invested in Stage 1, the supplier and the firm have the option to produce a product creating a value of v for the buyers in the downstream market. If only one or none of them has invested, this option is not available.

Stage 3. The firm, the suppliers of differentiated and undifferentiated inputs, and the buyers in the downstream market create and capture value in a free-form competitive interaction.

To solve the model, we use backward induction, starting from the last stage and rolling back to the first one. In Stage 3, we follow Brandenburger and Stuart's (2007) biform formalism to calculate the payoffs as the outcome of a coalitional (i.e., cooperative) game representing a free-form competitive interaction. In this cooperative game, the value creation of the grand coalition is the maximum value creation that can be achieved by the players. Because the value creation from the collaboration between the firm and the supplier v is a random draw, the value creation of the game will depend on whether v is higher or lower than the firm's outside option of 1. If $v \geq 1$, the value is maximized by the firm obtaining the input from the supplier and producing a superior product. If $v < 1$, the value is maximized by the firm not collaborating with the supplier and using its outside option to create a value of 1. Consequently, we can express the overall value creation with both the firm and the supplier as $\max(1, v)$. With only the supplier, nothing (a value of 0) is created, while with only the firm, a value of 1 is created using the outside option.

These value creation possibilities can be compactly rewritten in the formalism of cooperative games with the characteristic function $w(P)$ mapping a set of players P into the value they can create. The value created by the firm F and the supplier S is thus $w(F, S) = \max(1, v)$. The value created by the firm on its own is $w(F) = 1$, and the value created by the supplier on its own is $w(S) = 0$. Let x_F be the value captured by the firm, and x_S the value captured by the supplier. The core implies the following bounds on value capture: $x_F \in [1, \max(1, v)]$, and $x_S \in [0, \max(1, v) - 1]$.

As can be seen, the firm can guarantee a value capture of 1 for itself, as this is its outside option, while the additional value that the firm and supplier can create together ($\max(1, v) - 1$) is shared between the two players. We follow the biform games approach (Brandenburger & Stuart, 2007) and use the confidence index α to obtain a point estimate of the value capture. The confidence index of the firm is denoted α_F and the confidence index of the supplier is set at $\alpha_S = 1 - \alpha_F$ so we can interpret these confidence indices as bargaining power indices (Chatain & Zemsky, 2007). Specifically, α_F represents the share of the negotiable surplus that the firm will capture, while $1 - \alpha_F$ will be the share captured by the supplier. The negotiable surplus being here the added value of the supplier ($AV_S = \max(1, v) - 1 = \max(0, v - 1)$), the value capture by each player in Stage 3 of the game is calculated as follows:

$$x_F = 1 + \alpha_F AV_S = 1 + \alpha_F (\max(0, v - 1)), \text{ and } x_S = (1 - \alpha_F) AV_S = (1 - \alpha_F) (\max(0, v - 1)). \quad (1)$$

Given the uniform distribution of v , its range $[0, \bar{V}]$ and its density $\frac{1}{\bar{V}}$, we can calculate the expected value of AV_S as:

$$E(AV_S) = E(\max(v - 1, 0)) = \int_0^1 \frac{1}{\bar{V}} \times 0 dx + \int_0^{\bar{V}} \frac{1}{\bar{V}} (x - 1) dx = \frac{(\bar{V} - 1)^2}{2\bar{V}}. \quad (2)$$

We can now calculate the expected profits $\pi_F^{\text{No NGO}}$ and $\pi_S^{\text{No NGO}}$ in Stage 3 under the assumption that both sides invest:

$$\pi_F^{\text{No NGO}} = 1 + \alpha_F \frac{(\bar{V} - 1)^2}{2\bar{V}} - I_F, \text{ and } \pi_S^{\text{No NGO}} = (1 - \alpha_F) \frac{(\bar{V} - 1)^2}{2\bar{V}} - I_S. \quad (3)$$

3.2 | Value creation in the absence of the NGO

We first find the range of parameters in which collaboration between the firm and the supplier occurs without the NGO. Assuming the supplier invests, the firm also invests in the collaboration with the supplier if its expected payoff in that case is no less than its payoff without investment (i.e., 1):

$$\pi_F^{\text{No NGO}} = 1 + \alpha_F \frac{(\bar{V} - 1)^2}{2\bar{V}} - I_F \geq 1, \text{ or } \alpha_F \frac{(\bar{V} - 1)^2}{2\bar{V}} - I_F \geq 0. \quad (4)$$

Similarly, assuming that the firm invests, the supplier also invests if its payoff is nonnegative:

$$\pi_S^{\text{No NGO}} = (1 - \alpha_F) \frac{(\bar{V} - 1)^2}{2\bar{V}} - I_S \geq 0. \quad (5)$$

Deciding independently, both the firm and the supplier invest if and only if when they both expect nonnegative profits (given the alternatives) under the assumption that they both invest. This is the case when the expected value of the supplier's added value is high enough to cover these investments, that is, when $E(AV_S) \geq I_F/\alpha_F$ and $E(AV_S) \geq I_S/(1 - \alpha_F)$. Figure A.1 in File S1 represents the boundary between the set of parameters for which no investment is mutually profitable (below the shaded surface) and the set for which it is (above the shaded surface) depending on the firm's bargaining power α_F , the levels of investment I_F and I_S , and the expected added value of the supplier $E(AV_S)$. When the firm's and the supplier's bargaining positions are similar (i.e., at moderate levels of the firm's α_F), the constraint on the player's participation is less stringent: The collaboration can happen when the expected value creation is quite low. When there is a strong imbalance between the firm's and the supplier's value appropriation abilities, which occurs at the extremes of α_F , collaboration can only happen if the expected value creation is very high and allows sufficient value capture for the weaker actor. As the investment requirements increase, the area of collaboration becomes even more constrained, requiring even higher expected value creation and less extreme values for the firm's bargaining power.

3.3 | Market failure in the absence of the NGO

In order to understand whether the lack of collaboration between the firm and the supplier will lead to a market failure, we now compare the investment area in the baseline case with the area in which the investment is socially beneficial. We define *social welfare* as the total *economic* value created, net of the cost of investment, without accounting for distributional and aggregation issues among

economic agents (i.e., the firm, suppliers, and customers, although customers capture no value by assumption in our specific model). This is narrower than the notion of public interest (Mahoney et al., 2009), which accounts for the complexity of aggregating possibly contradictory private interests, encompassing economic but also political issues.

Formally, the investment is socially beneficial when $1 + E(AV_S) - I_F - I_S \geq 1$, where 1 is the value created and captured by the firm in the absence of collaboration. As a result, collaboration creates social welfare if $E(AV_S) \geq I_F + I_S$. This is represented by the area above the horizontal line $I_F + I_S$ on Figure 1. From a prior section, we also know that collaboration happens when $E(AV_S) \geq \max\left(\frac{I_F}{\alpha_F}, \frac{I_S}{1-\alpha_F}\right)$. On Figure 1, this area is delineated by the curves representing the firm's (I_F/α_F) and the supplier's ($I_S/(1 - \alpha_F)$) thresholds for investment.

If the expected value creation is too low to justify the investment (case when $E(AV_S) < I_F + I_S$), the absence of the collaboration will not constitute a market failure. In contrast, if the expected value creation is between the two thresholds (i.e., when $I_F + I_S \leq E(AV_S) < \max\left(\frac{I_F}{\alpha_F}, \frac{I_S}{1-\alpha_F}\right)$), or in other words, is high enough to justify the investment for the society as a whole, but does not allow sufficient value capture for individual actors, the failure to collaborate will lead to the loss of social welfare (the shaded area between the curves and the $I_F + I_S$ line).

3.4 | Model with NGO intervention

We have seen that different fundamentals about the potential for value creation can be a hurdle to the creation of relationships between a firm and its supplier, motivating the need to solicit help from NGOs to facilitate the creation of value. For instance, Dennis Macray, Starbucks's business practices manager at the time, remarked on the shade-grown coffee project: "Starbucks does not generally deal directly with individual farmers. We could not do this without [Conservation International]" (Austin & Reavis, 2002, p. 11). However, these NGOs also have their own agendas, the pursuit of which will be reflected in their collaboration decisions.

To explore this tension, we introduce into our model a third actor—the NGO—that does not directly participate in the production of the good, but that has an interest in making that transaction

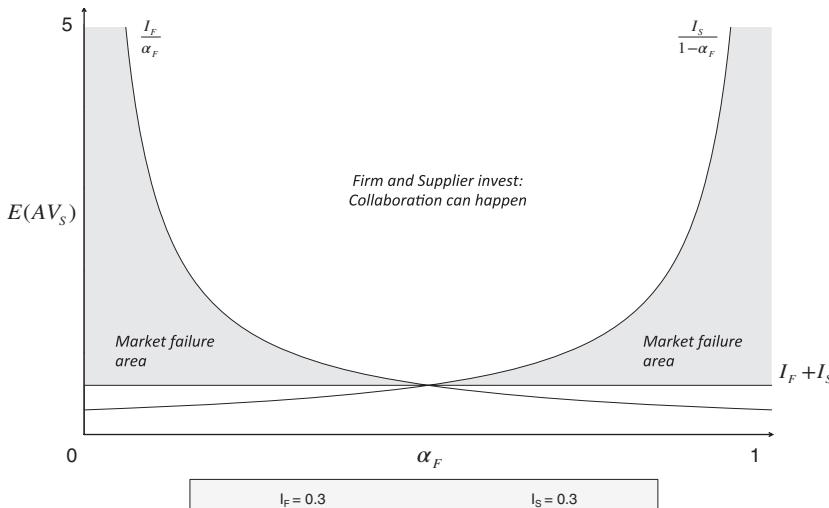


FIGURE 1 Market failure area in the absence of the NGO

happen. Specifically, we consider an NGO that seeks to increase the supplier's chances of successfully entering the commercial supply chain and selling a differentiated input to the firm, and that can improve the supplier's quality to achieve that end.³ The reason for this could be that the NGO is primarily interested in increasing the consumption of a product it especially cares about (e.g., organic fruits, shade-grown coffee, ecological textile, etc.). The NGO may also be interested in maximizing the adoption of a certain production process by suppliers because it wants to reduce certain environmental externalities. This closely resembles the mission statements of, for instance, environmentalist NGOs. Take the Rainforest Alliance whose mission is "to conserve biodiversity and ensure sustainable livelihoods by transforming land-use practices, business practices, and consumer behavior."⁴ Similarly, the Forest Stewardship Council aims "to promote environmentally sound, socially beneficial and economically prosperous management of the world's forests,"⁵ while UTZ Certified aims "to create a world where sustainable farming is the norm."⁶ We thus posit that the NGO's goal and the supplier's objective function are distinct—the NGO is not acting just on behalf of the suppliers.

We introduce an initial stage into the game (Stage 0) where the NGO can exert an effort $e \geq 0$ to improve the supplier's quality by e and shift the entire distribution of the supplier's quality from $\mathcal{U}(0, \bar{V})$ to $\mathcal{U}(e, \bar{V}+e)$. This shift makes the new distribution preferable without changing its density, which remains $1/\bar{V}$. Thanks to this, the NGO's effort has an identical effect on the final outcome (e) regardless of the initial draw. Because the expected quality of the supplier's input is now higher, it is more likely that the value creation by the firm and the supplier will be above the firm's outside option of 1, and consequently, that the firm and the supplier will invest in the collaboration. We impose $0 \leq e < 1$ in order to preserve the uncertainty about the supplier's quality compared to the firm's outside option of 1.

We model the NGO's utility as $U_{NGO} = z(e) - c(e)$ with $e \geq 0$. The first component of the NGO's utility, $z(e)$, measures the success of the NGO's preferred policy as a function of the NGO's effort e . Here, as the NGO's goal is to maximize the scope of the adoption of its preferred policy, $z(e)$ is the probability that the quality of the supplier's input will allow for the value creation that is higher than the firm's outside option of 1.

Let us assume that both the firm and the supplier make their respective relationship-specific investments and the NGO makes an effort $0 \leq e < 1$. Then this probability is equal to the integral of the density of $\mathcal{U}(e, \bar{V}+e)$ for the realizations that are between 1 and $\bar{V}+e$:

$$z(e) = \Pr(\mathcal{U}(e, \bar{V}+e) \geq 1) = \int_1^{\bar{V}+e} \frac{1}{\bar{V}} dx = \frac{\bar{V}+e-1}{\bar{V}}. \quad (6)$$

In other words, if investment in the collaboration happens, $z(e)$ is the probability that the supplier will be considered by the firm for the collaboration once the supplier's quality is revealed and is above 1. Intuitively, $z(e)$ increases in e . The greater the improvement in quality, the more likely it is that the value creation will be above 1, and the more likely it is for the collaboration between the firm and the supplier to occur. If there is no investment by either the firm or the supplier, investment never happens and the probability is equal to 0 (i.e., $z(e) = 0$).

The second component, $c(e)$ represents the disutility that the NGO experiences from exerting an effort e . This disutility could be interpreted as the cost in terms of time and resources to provide

³In value-based parlance (MacDonald & Ryall, 2018), the NGO is extending the maximum value capture of all participants while keeping its minimum value capture constant.

⁴<http://www.rainforest-alliance.org/about> (accessed 12 February 2017).

⁵<https://us.fsc.org/en-us/what-we-do/mission-and-vision> (accessed 12 February 2017).

⁶<https://utzcertified.org/en/aboututzcertified/vision-mission> (accessed 12 February 2017).

training for the supplier as well as the cost of reaching out and convincing the supplier to participate in the training. Another way to interpret it would be as the opportunity cost of time, which could otherwise have been spent on fundraising as well as the opportunity cost of these funds given other activities of the NGO. Along similar lines, it can be thought of as the damage to the NGO's reputation from collaborating with a firm, and so on. Overall, this disutility incorporates the idea of a monetary and nonmonetary cost that the NGO must bear in order to improve the supplier's quality. This disutility is incurred irrespective of the firm's and the supplier's investment decision, as the NGO makes the first move in the game, with a sunk investment.

For concreteness, we parameterize this disutility as $c(e) = \mu \frac{e^2}{2}$, where parameter μ scales the NGO's disutility (or NGO's cost) of reaching out to the supplier. We can think of this parameter as the inverse of the NGO's capabilities. Higher NGO capabilities imply lower cost (disutility) for the NGO and allow the NGO to exert a greater effort to improve the supplier's quality, whereas lower capabilities imply higher cost (disutility) and constrain the level of improvement e that the NGO can exert. Similarly to the NGO's disutility $c(e)$, the NGO's capabilities μ can be interpreted broadly: It may be NGO's reputation, prior connections with suppliers, marginal cost of raising the funds, knowledge stock (to develop the training), and so on.

For example, Conservation International has already launched a pilot project on shade-grown coffee with several cooperatives prior to its partnership with Starbucks (Austin & Reavis, 2002), which in our model will correspond to low μ , while Rainforest Alliance had no experience with tea farmers in Africa before collaborating with Unilever on Lipton brand (Braga, Strelbel, Ionescu-Somers, & Seifert, 2011b), that is, high μ . More generally, it may be cheaper for a larger and more renowned NGO to find and persuade suppliers to join their training program; it may also be easier for such an NGO to attract funds (and thus, make the opportunity cost of the funds lower). We assume that μ is high enough to ensure that the optimal e remains within interesting bounds in our analysis (in particular, so that it does not overshoot 1, making the analysis trivial).

We thus have, with $e \geq 0$:

$$U_{NGO}(e) = \begin{cases} \frac{\bar{V}+e-1}{\bar{V}} - \mu \frac{e^2}{2}, & \text{if both supplier and firm invest in the collaboration,} \\ -\mu \frac{e^2}{2}, & \text{otherwise.} \end{cases}$$

It should be noted that if there is no investment in the collaboration, the NGO is better off making no effort at all and setting $e = 0$. If the NGO makes an effort $e > 0$, then the expected value of a collaboration increases and the payoffs for the firm and the supplier are, respectively:

$$\pi_F = \alpha_F \frac{(\bar{V}+e-1)^2}{2\bar{V}} - I_F, \text{ and } \pi_S = (1-\alpha_F) \frac{(\bar{V}+e-1)^2}{2\bar{V}} - I_S. \quad (7)$$

Note that for simplicity's sake, we defined π_F net of the value of 1 that the firm is guaranteed to appropriate in any case. This does not impact the analysis and simply normalizes the profit of the firm at 0 if there is no collaboration with the supplier.

3.5 | NGO equilibrium effort levels

In this section, we focus on the NGO's decision and characterize the NGO's optimal effort level. In the following, we assume $I_S = 0$, which can be interpreted as the supplier having nothing to invest to make a potentially usable input, or alternatively that this investment is entirely contractible, and ultimately, underwritten by the firm. This then subsumes I_S into I_F . In that scenario, the supplier can

verifiably make the appropriate investment using cash provided by the firm, even though the outcome (or the intrinsic ability of the supplier) remains unknown. We make this assumption (which we relax in Appendix E in File S1) because it permits us focusing on the relationship between the firm and the NGO, as the firm is the actor that empirically seems to play the most pivotal role as it holds key complementary assets for the distribution and transformation of the suppliers' input. In addition, this permits to significantly ease the exposition without obscuring the implications of the model.

To determine the NGO's decision-making in terms of effort e , we define three critical values of this effort. Consider first \hat{e} , the optimal level of effort under the assumption that investment by both the firm and the supplier will happen. This optimal effort level that maximizes the probability that the supplier can enter the market (the first part of the NGO's utility equation) given the "cost" to the NGO (the second part of the equation), is $\hat{e} = \frac{1}{\mu V}$. As is intuitive, \hat{e} is decreasing when the NGO is less efficient (higher μ). The effort is lower with a higher \bar{V} , meaning decreasing returns to effort if the initial distribution was more favorable.

Second, consider the strictly positive effort level at which the NGO is indifferent between not making an effort (setting $e = 0$) or making a strictly positive effort ($e > 0$). This is the upper bound for the NGO's effort. We denote this effort e^{ub} and find it by solving $U_{NGO}(e^{ub}) = 0$, $e^{ub} > 0$.

Finally, consider the minimum strictly positive effort level at which the firm would prefer to invest if the supplier invests as well (e^{collab}), that is, the smallest e for which $\pi_F \geq 0$.⁷ These effort levels are:

$$e^{ub} = \frac{1}{\mu \bar{V}} + \frac{\sqrt{1+2\mu \bar{V}(\bar{V}-1)}}{\mu \bar{V}} > \hat{e}, \text{ and } e^{collab} = \max \left(0, 1 - \bar{V} + \sqrt{\frac{2I_F \bar{V}}{\alpha_F}} \right). \quad (8)$$

The value of e^{collab} can be above or below either of \hat{e} or e^{ub} . The following lemma shows that the optimal effort e^* of the NGO is determined by the relative order of these values.

Lemma 1 Denote e^* the NGO's effort that maximizes its utility function. Assuming $I_S = 0$, e^* can take three values depending on the relative levels of e^{collab} , \hat{e} , and e^{ub} .

1. If $e^{ub} < e^{collab}$, the NGO's optimal effort e^* will be equal to 0, and the firm will not invest in the collaboration with the supplier.
2. If $\hat{e} < e^{collab} \leq e^{ub}$, the NGO's optimal effort e^* will be equal to e^{collab} , and the firm will invest I_F in the collaboration with the supplier.
3. If $e^{collab} \leq \hat{e}$ and $e^{collab} \leq e^{ub}$, the NGO's optimal effort e^* will be equal to \hat{e} , and the firm will invest I_F in the collaboration with the supplier.

The intuition for the result is as follows. The problem of the NGO is to make the effort that maximizes its utility under the constraint of the firm being willing to invest into collaboration. This constraint is met if the NGO invests at least as much as e^{collab} . Given this constraint, the NGO can be in one of three situations. If $e^{ub} < e^{collab}$, the NGO's maximum acceptable effort e^{ub} is still not enough to meet the firm's participation constraint. In this case, the NGO gives up on intervening and sets its effort to zero ($e^* = 0$). If $\hat{e} < e^{collab} \leq e^{ub}$, the NGO is able to meet the firm's participation constraint by making an effort that is above its preferred effort of \hat{e} but still below the maximum acceptable

⁷Note that $\pi_F = 0$ does not mean that the firm is earning accounting profits equal to 0. Rather, it means that the firm is earning merely normal returns as value capture is net of opportunity costs in the value-based framework.

effort. The NGO's utility maximizing effort is then $e^* = e^{collab}$ as any effort above this level reduces the NGO's utility and is no longer necessary to make the firm invest. Finally, if $e^{collab} \leq \hat{e}$, the NGO simply sets $e^* = \hat{e}$, which allows the NGO to both set its effort at the unconstrained level \hat{e} and meet the firm's participation constraint.

The import of this result is to show that the NGO's policy will be largely determined by the need to meet the participation constraint of the firm. In particular, it shows that in order to induce participation from the firm, the NGO may have to exert a high level of effort while it would actually prefer to make less effort.⁸ This result is an extension to Hypothesis 1 in King (2007), which states that in order to induce a firm to choose an environmentally friendly production option a stakeholder may need to invest in order to make that option superior to the firm's outside option. Our lemma provides further details by distinguishing between e^{collab} and \hat{e} .

Moreover, finding that there are three different regimes of effort exertion for an NGO also helps interpreting cases and organizing evidence about NGO activities in relation to firms and suppliers. For instance, the IMD case on Unilever Tea (Braga, Strelbel, Ionescu-Somers, & Seifert, 2011a; Braga et al., 2011b) shows how Unilever's partnership with the Rainforest Alliance, which set out to convert its suppliers for the Lipton tea brand to sustainable practices, varied among different countries.

The Rainforest Alliance found it relatively easy to certify large tea estates in Kenya and Tanzania as the *ex ante* quality was already high (many sites had already implemented certain sustainable practices), and the sites were easily reachable by Rainforest Alliance representatives. Marc Monsarrat, Rainforest Alliance manager for East Africa and South Asia, commented on the training of the managers of the large tea estates: "Usually, after a single training session, the staff of large tea estates was able to acquire the basic knowledge to start implementing the changes we required for certification [...]. In a few months we could stir sufficient changes to bring many to compliance level with certification standards" (Braga et al., 2011b, p. 2). In the framework of our model, this could represent the situation in which the NGO is able to exert its optimal effort \hat{e} . However, when Unilever extended the sustainable tea initiative to tea smallholders in Kenya and other countries, the Rainforest Alliance found it more difficult to reach the suppliers. In addition, the Rainforest Alliance had little prior expertise in tea industry, and small farmers, unlike the large tea estates, did not have many sustainable practices in place. In Kenya, the initiative succeeded only with the help of a local agency (the Kenya Tea Development Agency) and required high levels of human and financial resources, leading to serious questions about the efficiency of a high touch approach to training farmers in this context (Braga et al., 2011b). The perceived need for additional resources to achieve a satisfactory outcome corresponds to the situation in which the NGO is forced to make additional, and yet, suboptimal effort e^{collab} in order to meet the constraint of the firm.

In Argentina, however, there was no way to organize tea farmers, in a manner similar to Kenya. Marc Monsarrat, Rainforest Alliance manager for East Africa and South Asia, said: "It is definitely more challenging in other countries where smallholders operate on a one-to-one basis (and not as a group) with factories. It is generally a big struggle around the world to organize a large number of small producers in a competitive manner" (Braga et al., 2011b, p. 5). Consequently, Unilever and Rainforest Alliance partnered with a regional NGO (Imaflora) that could bring small tea farmers to the discussion table. This can be interpreted as a situation where the effort required from the Rainforest Alliance was too costly ($e^{collab} > e^{ub}$) and the NGO was not capable of meeting the firm's

⁸In online Appendix E in File S1, we show that this also applies to the participation constraint of the supplier. The central mechanism is the same except that there could be a fourth possible level of equilibrium effort for the case in which the NGO needs to make additional efforts to meet the supplier's participation constraint.

constraint on its own. Engaging another NGO with greater capabilities to reach the suppliers (Imaflora, in this case), allowed this situation to be transformed into the scenario where $\hat{e} < e^{collab} \leq e^{ub}$ and where the NGO was able to make the effort required to bring about the collaboration. Overall, these examples illustrate how different level of NGO's capabilities in different contexts resulted in different outcomes for the firm and the NGO, to the extent that another NGO had to be enlisted in order to meet the firm's participation constraint.

3.6 | NGO effort and the firm's bargaining power

Building on Lemma 1, we can present additional analyses that relate features of the value creation and value capture environment to NGO's equilibrium effort levels. In particular, the fact that the NGO's effort is sometimes designed to induce the firm's collaboration introduces non-obvious discontinuities in the NGO's optimal effort leading to counterintuitive patterns.

For instance, we find that unless the firm has a very high bargaining power, the NGO actually benefits from the firm appropriating more value at the expense of the supplier, even though conventional wisdom would suggest that the NGO prefers the distribution of value favoring the supplier. The mechanism behind this is that with the firm being able to capture a greater share of value, the firm's participation-inducing level of effort decreases, thus allowing the NGO to make less effort when it has to meet the firm's constraint.

The NGO's compensatory reduction of effort when the firm's bargaining power increases implies that the firm is not seeing any improvement in its value capture, even when there is more value created overall. The lack of change in value capture for the firm creates a "valley of frustration" when seemingly improving circumstances for the partnership would not lead to improved outcomes, as will be detailed in Section 5. Furthermore, from the firm's perspective, only the firms with a high bargaining power will be able to make positive profits from the collaboration with the NGO and the supplier, while the firms with moderate bargaining power will get only minimal profit.

We can reformulate Lemma 1 in terms of critical values for the firm's bargaining power (α_F):

Proposition 2 Consider the decision of the NGO assuming $I_S = 0$ and that the firm is not investing in collaboration if $e = 0$. Then, there exist two thresholds $0 < \alpha_F^{\min} < \alpha_F^{\text{opt}}$ such that:

1. If $0 \leq \alpha_F < \alpha_F^{\min}$, the NGO's effort is 0 and there is no collaboration between the firm and the supplier.
2. If $\alpha_F^{\min} \leq \alpha_F < \alpha_F^{\text{opt}}$, the NGO's effort is equal to e^{collab} and is decreasing in α_F .
3. If $\alpha_F^{\text{opt}} \leq \alpha_F$, the NGO's effort is equal to \hat{e} and is decreasing in μ .

Figure 2 provides illustration for this proposition. The two horizontal lines represent the optimal unconstrained effort for the NGO \hat{e} and the maximum effort that the NGO can exert e^{ub} . The minimum effort required by the firm e^{collab} is represented by the downward-sloping curve: The higher the firm's share of value (higher α_F), the smaller increase in value creation the firm needs to break even. At low levels of α_F there is no $e < e^{ub}$ that makes collaboration worthwhile for the firm. At $\alpha_F = \alpha_F^{\min}$, we have $e^{ub} = e^{collab}$, meaning that the NGO is indifferent between making an effort and not making an effort just as the firm is indifferent between collaborating and not collaborating. From this point, as α_F increases, the NGO prefers to make an effort at level e^{collab} , while still providing sufficient inducement to the firm, which is still just breaking even. We call this area the "valley of frustration" as the firm captures only the minimum needed to break even while the NGO is making its

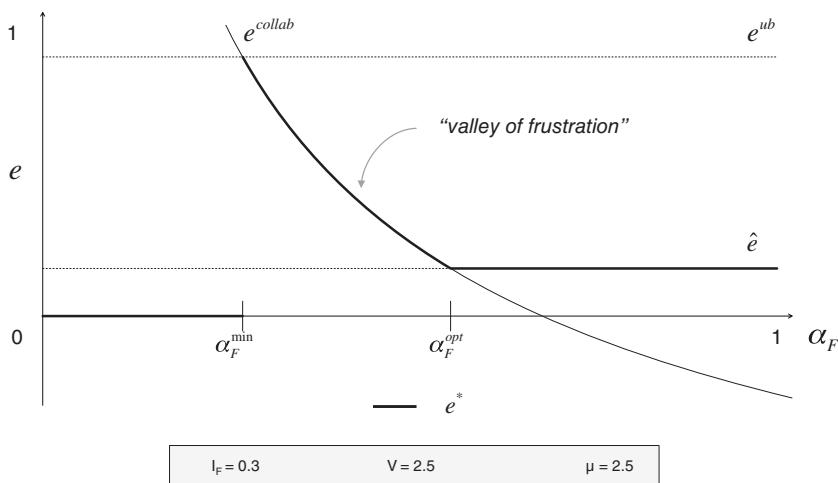


FIGURE 2 Firm bargaining power and NGO optimal effort

largest effort. Finally, if $\alpha_F^{opt} \leq \alpha_F$, the NGO's effort level attains its first best level \hat{e} and is independent from α_F . Intuitively, the NGO's first best effort level \hat{e} is higher when the cost of exerting the effort is lower (i.e., when the NGO has lower μ).

The negative relationship between the firm's α_F and e^{collab} gives rise to a counterintuitive outcome: The NGO prefers the firm to have a higher bargaining power vis-à-vis the supplier. This is particularly striking as we would usually expect the NGO's involvement in the supply chain result in a higher value appropriation by the supplier. However, our model shows that if this is the case, then the NGO is worse off unless the change in the value distribution between the firm and the supplier keeps the firm's bargaining power α_F above the critical value α_F^{opt} .

Suppose that the presence of the NGO bolsters the supplier's bargaining position and the firm's bargaining power drops to $\alpha_F' < \alpha_F$. If the reduction in the firm's bargaining power results in $\alpha_F' < \alpha_F^{\min}$, making the collaboration unattractive for the firm, then the NGO does not make the effort, the transaction between the firm and the supplier does not materialize, and all three players are left worse off. If the reduction in the bargaining power results in $\alpha_F^{\min} < \alpha_F' < \alpha_F^{opt}$, the collaboration will still happen; however, it will necessitate a higher effort from the NGO. While the supplier will increase its welfare compared to the situation with the α_F , the NGO will have to stretch its resources more in order to induce the firm to participate. This may explain the fact that NGOs like Rainforest Alliance and UTZ Certified do not require firms in coffee and cocoa markets to pay a premium price to farmers (i.e., accept a lower α_F in our model) (Gunther, 2015; McAllister, 2004).

If the NGO anticipates that there will be a reduction in the firm's bargaining power such that $\alpha_F' < \alpha_F^{opt}$, the NGO will either not make the effort (if it expects $\alpha_F' < \alpha_F^{\min}$) or will have the incentives to restore the original bargaining positions between the actors. The following corollary thus follows from Proposition 2:

Corollary 3 *The anticipation of a decrease in α_F from above to below α_F^{\min} will prevent collaborations from happening.*

While a leading motive for the involvement of NGOs in the trade between weaker suppliers and powerful firms is to improve the terms of the exchange for the suppliers, this corollary shows that such improvement can backfire if it makes the firm giving up on the collaboration.

4 | FIRM INTERNALIZES THE DEVELOPMENT OF SUPPLIERS

So far, we have assumed that only the NGO has the necessary technology to improve the quality of the supplier (we use *technology* as shorthand for the requisite knowledge and capabilities, including those needed to reach the supplier). This is, however, a restrictive assumption as the firm could plausibly have the option to internalize the development of suppliers rather than delegating it to an NGO. For example, while some chocolate producers collaborate with NGOs (such as, e.g., UTZ Certified), Hershey and Cargill have established their own program to train cocoa farmers in Côte d'Ivoire in sustainable practices.⁹

In such cases, what will drive the firm's choice between collaborating with the NGO versus improving by itself the quality of the suppliers? The answer depends on the balance of two opposite forces. On the one hand, the NGO is assuming costs that the firm does not need to expense, which pushes the firm to rely on the NGO; on the other hand, the NGO's development decision is not the one preferred by the firm, which can make the firm prefer to internalize. Our analysis that follows suggests that the former is usually stronger than the other. In particular, we show that the firms with high bargaining power benefit from the internalization of improvement effort, notably when the *ex ante* quality of the supplier is high, and when the investment requirements are moderate.

We extend the baseline model and assume that the firm is able to make the effort to improve the supplier's quality at the cost $\mu_F \frac{e_F^2}{2}$, where μ_F denotes the firm's capabilities and e_F the level of effort by the firm. Note that we reserve the symbol e , without subscript F , for the effort of the NGO and use e_F , and its variations, for the firm's effort. The firm's expected incremental profit π_F from collaboration with the supplier and the optimal level of effort \hat{e}_F by the firm (assuming it is better off not collaborating with the NGO and working with the supplier) are, respectively:

$$\pi_F = \alpha_F \frac{(\bar{V} + e_F - 1)^2}{2\bar{V}} - I_F - \frac{\mu_F e_F^2}{2}, \text{ and } \hat{e}_F = \frac{\alpha_F (\bar{V} - 1)}{\bar{V} \mu_F - \alpha_F}. \quad (9)$$

The firm's optimal level of effort \hat{e}_F increases in \bar{V} , while the NGO's optimal level of effort \hat{e} decreases in \bar{V} illustrating the difference in the firm's and the NGO's incentives.¹⁰ While the NGO only needs the supplier to meet the firm's quality threshold, the firm always prefers to achieve higher value creation with the supplier as it can appropriate some of this value. This misalignment of the objective functions of the firm and of the NGO means that the firm would sometimes prefer the NGO to make a higher effort, while the NGO is satisfied at a lower level.¹¹ The firm thus faces a trade-off between saving on costs by relying on the NGO, and spending more but achieving full alignment.

To analyze the firm's decision, we define two critical thresholds for its confidence index α_F . Let us denote α_F^a the level of α_F at which $\pi_F(\hat{e}_F) = 0$. The firm will have positive profit from exerting the effort \hat{e}_F when $\alpha_F > \alpha_F^a$, making internalization an option preferred to doing nothing. Let us denote α_F^b the level of α_F such that $\pi_F(\hat{e}_F) = \pi_F(\hat{e})$, that is, when the firm is indifferent between improving

⁹Nieburg O. 2014. Hershey and Cargill team up on Ivorian cocoa program. <http://www.confectionerynews.com/Commodities/Hershey-and-Cargill-Ivory-coast-cocoa-program> (accessed 29 August 2017).

¹⁰Technically speaking, \hat{e}_F increases in \bar{V} if $\mu_F > \alpha_F$; however, in the case when $\mu_F < \alpha_F$, we have $\hat{e}_F > 1$ making the analysis trivial.

¹¹This divergence in objective functions and first best effort levels is somewhat similar to the analysis in online Appendix F in File S1 on the social welfare maximizing level of effort.

supplier's quality on its own and relying on the NGO. When $\alpha_F > \alpha_F^b$, the firm will have higher profits when making the effort on its own rather than collaborating with an NGO. Considering the thresholds α_F^{min} and α_F^{opt} that provide the bottom thresholds for the NGO's participation-inducing level e^{collab} and first best level \hat{e} , respectively, we can show how the firm chooses between the absence of action, collaboration, and internalization. We assume that the firm is as efficient as the NGO by positing $\mu_F = \mu$, which says that the NGO has no capability advantage over the firm. This is a conservative assumption as research shows that pursuing economic objectives comes at the expense of efficiency in achieving social goals (Battilana, Sengul, Pache, & Model, 2015).

Proposition 4 Consider the decision of the firm assuming that it possesses the capability to improve the quality of the supplier. Denote e^* the optimal effort of the NGO and e_F^* the optimal effort of the firm. Assume that $I_S = 0$ and $\mu_F = \mu$. The firm's decision is as follows:

- If $\alpha_F < \min(\alpha_F^{min}, \alpha_F^a)$, the firm does not collaborate with the NGO, exerts no effort ($e_F^* = 0$), earns $\pi_F = 0$, and the NGO exerts no effort ($e^* = 0$).
- If $\alpha_F^{min} \leq \alpha_F < \min(\alpha_F^{opt}, \max(\alpha_F^a, \alpha_F^b))$, then the firm collaborates with the NGO, exerts no effort ($e_F^* = 0$), earns $\pi_F = 0$, and the NGO exerts effort $e^* = e^{collab}$.
- If $\alpha_F^{opt} \leq \alpha_F < \max(\alpha_F^a, \alpha_F^b)$, then the firm collaborates with the NGO, exerts no effort ($e_F^* = 0$), earns $\pi_F > 0$, and the NGO exerts effort $e^* = \hat{e}$.
- If $\alpha_F \geq \max(\alpha_F^a, \alpha_F^b)$, then the firm internalizes the effort, setting its level of effort at $e_F^* = \hat{e}_F$, earns $\pi_F > 0$, and the NGO is not active ($e^* = 0$).

Figure 3 illustrates this proposition by mapping the areas of the firm's strategic choices depending on the firm's bargaining power α_F and the investment requirement I_F . First, we can see that when the investment requirement I_F is high, or when the firm's bargaining power α_F is low, the effort is too costly for both the NGO and the firm, and thus, the firm will not be able to transact with the supplier.

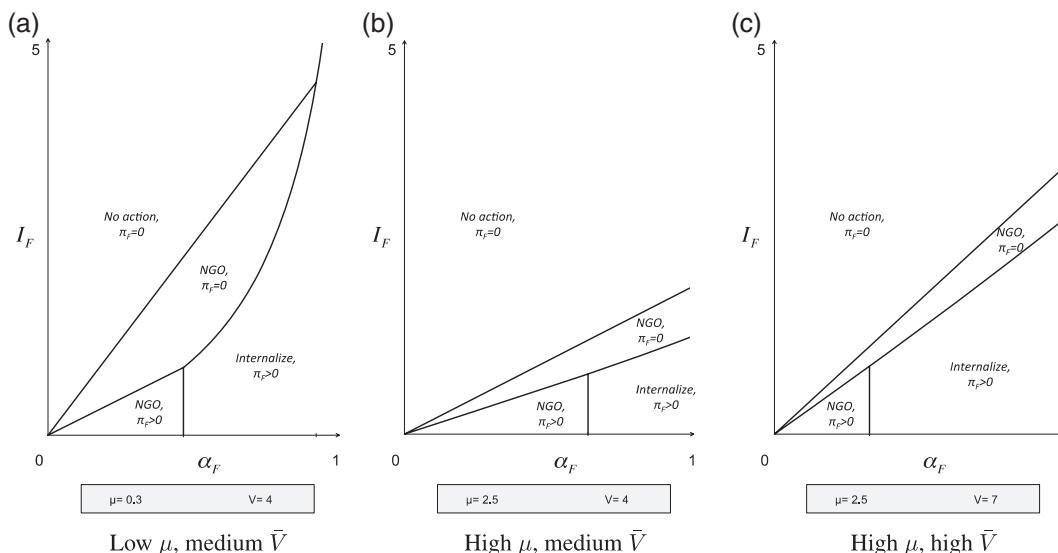


FIGURE 3 Illustration of the firm's internalize or ally with NGO optimal decision

As the investment requirement becomes lower and the firm's bargaining power grows, internalization still remains prohibitively costly for the firm, but the NGO is able to make the participation-inducing effort e^{collab} that makes the firm willing to use the supplier. The firm will thus collaborate with the NGO, though it still cannot make positive profit as it is still stuck in the "valley of frustration" (see the next section). An exception is the case when the firm has very high capabilities (i.e., low μ_F): At a very high investment level, the firm will forgo the collaboration with the NGO altogether and will integrate the effort directly (the upper right part of Figure 3a). At low levels of investment requirement and higher α_F , the NGO is finally able to make its first best effort \hat{e} , which means that the firm can get positive profits from the transaction with the supplier under collaboration with the NGO. At the same time, the firm is finally able to make the effort internally and get positive profits. This illustrates the trade-off between the cost of effort and the misalignment of incentives where firms with lower bargaining power are better off working with the NGO, while firms with higher bargaining power are better off internalizing the effort.

The intuition for these results is the following. When the firm's bargaining power is low, the supplier captures most of the value created through the improvement of the quality, which first, makes the firm unwilling to make a large effort, and second, makes the net gain very small. Thus, when the firm is weaker vis-à-vis the supplier the firm is better off collaborating with the NGO either because the NGO will actually make higher effort than the firm, or because not incurring the cost of effort outweighs the misalignment in incentives. As its bargaining power grows, the firm is willing to make a larger effort to improve the supplier's quality because it is going to appropriate a larger share of the ensuing value created. In this case, the benefit of having higher value creation outweighs the benefit of getting a lower improvement at no cost, and the firm is better off internalizing the effort.

These findings are consistent with sustainability initiatives in the coffee market where large coffee roasters, such as Nestle and Mondelez, have their own sustainability training programs for farmers, while Starbucks, which has a lower market share, partners with Conservation International (Panhuyzen & Pierrot, 2014). Interestingly, a small roaster Counter Culture Coffee originally established its own certification scheme, but eventually abandoned it (MacGregor, Ramasar, & Nicholas, 2017), consistent with our results that weaker firms should not pursue internalization. Furthermore, comparing Figures 3b and 3c, we can see that as the supplier's *ex ante* quality grows the area where the firm benefits from internalization also increases, while the area of collaboration with the NGO is reduced. For instance, HortiFruti—a Costa Rican supermarket chain—did not resort to the NGO for training the farmers in Costa Rica where the farmers exhibited already high level of agricultural practices. However, in Nicaragua, the level of farmers' skills was much lower, prompting HortiFruti to partner with several local NGOs to bring the quality level to the bar (Leguizamon & Ickis, 2009).

This analysis shows the benefit of an actor involved in the supply chain that has incentives that are divergent from those of the for-profit actors. First, even if the firm were able to improve the supplier's quality on its own, weaker firms benefit from the existence of the NGO as the NGO's involvement substitutes for the effort the firm would have made, allowing substantial saving. Furthermore, the existence of the NGO benefits society as a whole as it allows the transaction between the firm and the supplier to happen under the conditions where the firm would not have made the improvement effort itself (the area where the NGO makes effort e^{collab}). On the other hand, if the firm with high bargaining power has the capability to reach suppliers on its own, it can have higher profit than under NGO's effort, and provided it is highly efficient, it can have positive profit when under the NGO it would have earned zero profit (because the effort is too costly for the NGO).

5 | NGO EFFORT AND SUPPLY CHAIN PARTICIPANTS' PREFERENCES

So far, we have focused on determinants of the equilibrium level of effort by the NGO and found that there are three regimes for the NGO. We now investigate how the players' outcomes (profitability and utility) vary in function of the characteristics of the *other* players, focusing on the effect of the NGO's efficiency parameter μ and the effect of the firm's bargaining power α_F . We do this in the context of the base model where only the NGO is able to improve the distribution of the supplier's outcomes and the firm cannot internalize such effort. This helps determine how each participant cares about the characteristics of their partners. For instance, when Unilever decided to train the suppliers of its Lipton brand in sustainable tea growing, it was considering three NGOs as potential partners (Fairtrade, UTZ Certified, and Rainforest Alliance), of which the latter was chosen (Braga et al., 2011a). Formal analysis of the model shows:

Proposition 5 Assume $I_S = 0$ and that the firm is not investing in collaboration if $e = 0$. Then, the effects of μ on firm profits and of α_F on NGO utility are as follows:

1. If $0 \leq \alpha_F < \alpha_F^{min}$, we have $\pi_F = 0$, and $\frac{\partial \pi_F}{\partial \mu} = 0$, $U_{NGO} = 0$, and $\frac{\partial U_{NGO}}{\partial \alpha_F} = 0$.
2. If $\alpha_F^{min} \leq \alpha_F < \alpha_F^{opt}$, we have $\pi_F = 0$, and $\frac{\partial \pi_F}{\partial \mu} = 0$, $U_{NGO} > 0$, $\frac{\partial U_{NGO}}{\partial \alpha_F} > 0$ and $\frac{\partial^2 U_{NGO}}{\partial \mu \partial \alpha_F} > 0$.
3. If $\alpha_F^{opt} \leq \alpha_F$, we have $\frac{\partial \pi_F}{\partial e} > 0$, $\frac{\partial \pi_F}{\partial \mu} < 0$, $\frac{\partial^2 \pi_F}{\partial \mu \partial \alpha_F} < 0$, $U_{NGO} > 0$, and $\frac{\partial U_{NGO}}{\partial \alpha_F} = 0$.

The first part of the proposition is straightforward: At low levels of α_F there is no collaboration between the firm and the supplier, implying profits and utility equal to 0 for everyone. The second and the third parts of the proposition allow to further expound the relationships between the parameters of the model to understand what each participant cares about in the other participants' characteristics under each regime of NGO effort.

From the NGO's point of view, stronger bargaining power of the firm is helpful at moderate levels of bargaining power ($\alpha_F^{min} \leq \alpha_F < \alpha_F^{opt}$) as it relieves the NGO ($\frac{\partial U_{NGO}}{\partial \alpha_F} > 0$) and enables it to dial back its effort toward the first best \hat{e} (as discussed in Section 3.6). Because the NGO's goal is to increase the consumption of the product, rather than supplier's welfare, higher value appropriation by the firm does not decrease the NGO's utility. This is even more pronounced when the cost of being away from the first best is high (higher μ) as shown by $\frac{\partial^2 U_{NGO}}{\partial \mu \partial \alpha_F} > 0$. From the NGO's standpoint, own efficiency (lower μ) and the firm's bargaining power (α_F) are *substitutes*.¹² For instance, in the partnership between Cargill International and The Nature Conservancy on sustainable soy production in Brazil the firm—one of the three largest soy traders exporting from 80 to 90% of the soy produced in the region—did not pay a price premium to farmers, thus allowing Cargill to appropriate the entire value created (*The Telegraph*, 2007; Wasserman, Hull, & McCutchan, 2014). Given that after three years of collaboration only 20% of farmers were compliant (McAllister, 2008), this is consistent with the case when the NGO does not have sufficient capabilities and wants to work with a firm that appropriates more value.

These effects are no longer in play when the NGO is selecting its optimal effort \hat{e} , which happens at high levels of α_F . It is no longer preoccupied with meeting the firm's participation constraint and its utility no longer depends at the margin on the characteristics of the firm.

¹²Note that the positive cross partial $\frac{\partial^2 U_{NGO}}{\partial \mu \partial \alpha_F}$ formally shows complementarity between bargaining power and *inefficiency* (μ). Changing variables, this is equivalent to substitutability between bargaining power and efficiency ($1/\mu$), which is easier to interpret.

For the firm, the situation is reversed. At moderate levels of bargaining power, when the NGO exerts the participation-inducing effort e^{collab} , the firm is at the margin indifferent to the NGO's characteristics because it is getting minimal profit no matter what happens on the side of the NGO. This is what we call the "valley of frustration." The firm is just incentivized to participate, thanks to the high level of NGO effort, but any change of parameter at the margin does not translate in change in value capture. The reason is that any factor leading to increased value capture by the firm is met by a compensatory reduction in effort by the NGO: Seeing that the firm can capture more value (higher α_F) or equivalently that there is more value created overall, the NGO takes this opportunity to scale back its effort toward its preferred level \hat{e} .

However, at high levels of bargaining power, when the NGO makes its first best effort \hat{e} , the NGO's efficiency does matter to the firm. A more efficient NGO (i.e., lower μ) picks a higher \hat{e} and creates a larger surplus in the supply chain, a slice of which is appropriated by the firm. As a result, we have $\frac{\partial \pi}{\partial \mu} < 0$. Moreover, the firm appropriates even more from this surplus if it has high bargaining power, and thus, $\frac{\partial^2 \pi_F}{\partial \mu \partial \alpha_F} < 0$. Here, we see that for the firm its bargaining power (α_F) and the NGO's efficiency (lower μ) are *complements*.

6 | PATTERNS OF STABLE NGO-FIRM MATCHINGS

Based on the results of Proposition 5, we can work out how a matching process involving multiple competing firms and NGOs would unfold prior to the NGOs and the firms actually setting into motion their potential collaboration. This allows understanding what overall matching pattern of NGOs and firms we should expect to emerge looking at a large population of firms and NGOs. We provide technical details about the actors' preferences and the matching process in the online Appendix C in File S1.

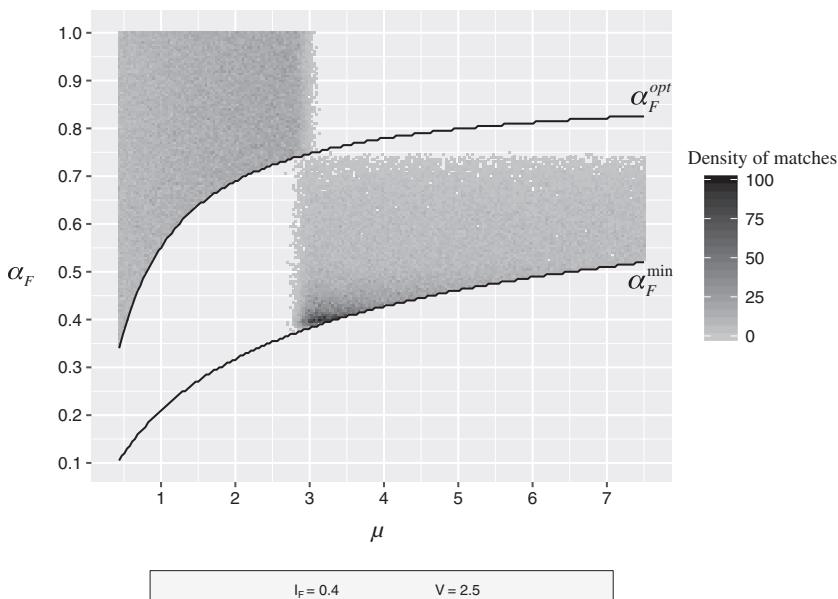


FIGURE 4 Density of matches between firms and NGOs (1,000 simulations)

Figure 4 shows the density of stable matches found in the computational experiment. The first striking feature of this result is the partition of the stable matches into two disjoint areas. The first area comprises the high α_F firms and the low μ NGOs, in the upper left corner of Figure 4. These matches are all above the line formed by the α_F^{opt} value. Matches happen in this area until the supply of both types is exhausted, which happens for a value of μ such that supply and demand in the optimal effort area are equalized. This value is a little bit different for each run in function of the randomization of cases of ties in preferences, giving the fuzzy vertical and horizontal boundaries.

Below and to the right of this point, below α_F^{opt} and above α_F^{min} , lies the second cluster of matches. Firms matching in this area are relegated to higher values of μ due to the lower μ NGOs being competed away in the first cluster. At the bottom left corner of this cluster, we observe a concentration of matches. We interpret this bunching as the result of the accumulation of demand by firms with medium levels of α_F (e.g., $\alpha = 0.4$ in the figure) that are facing few matching opportunities because at their level of α_F most NGOs are not efficient enough to make matching better than not matching at all, while the more efficient NGOs are already taken by higher α_F firms.

The forces of selection and matching create strong empirical patterns. The population of matched organizations in the simulated data is showing a *negative* correlation ($\rho = -0.48$) between α_F and μ while there is a *positive* correlation within each cluster, equal to $\rho = 0.51$ in the upper left cluster and $\rho = 0.41$ in the medium right cluster. By contrast, if matching were random and not subject to selection, there would be no correlation between α and μ .

Let us imagine a hypothetical example of a market where a number of firms and NGOs are searching for partners. Our model can predict how the matching is going to unfold and provide recommendations to the actors for their search strategy. NGOs that have a high μ should probably not waste resources on trying to reach out to high α_F firms. Those are likely to be scooped by more efficient, low μ , NGOs that will concentrate on securing partnerships in that segment of firms. Firms with high α_F can also confidently orient their search toward low μ NGOs. However, firms with intermediary levels of α_F (from approximately 0.35 to 0.75 in our figure) have the most at stake as they can either succeed in securing a very efficient NGO partner, or be stuck with a less efficient NGO as matches in-between are not stable. They have the most incentives to intensively search and propose partnership with very efficient NGOs.

7 | OTHER EXTENSIONS AND ROBUSTNESS CHECKS

In the online appendices of this article, we include additional analyses and robustness checks. In Appendix D in File S1, we allow for cash transfers between parties and find that, while the firm never finds it profitable to subsidize the NGO, the latter may often have an interest to motivate the firm's participation through a direct cash transfer rather than through improvement in the value creation potential of the suppliers. In Appendix E in File S1, we relax the assumption of the firm fully subsidizing the supplier. We find that in this case the NGO's equilibrium level of effort is U-shaped in the firm's bargaining power, and given the need to induce participation from the firm and the supplier alike, the NGO is able to exert its optimal $\hat{\epsilon}$ only at intermediate levels of the firm's α_F . In Appendix F in File S1, we provide a detailed analysis comparing social welfare with the NGO to a situation where a planner having access to the NGO's value improvement technology seeks to maximize economic welfare. This analysis shows that the NGO is generally making less effort compared to the social optimum, but that there are also situations where it is making more effort. Finally, in Appendix G in File S1, we explore the situation when the NGO is purely interested in the

economic interests of the suppliers seeking to maximize their aggregated profits. We find that in such case the NGO's optimal effort is no longer U-shaped in the firm's bargaining power. Instead, once firm participation is secured, NGO's effort decreases monotonically with firm bargaining power, reflecting reduced returns to effort as more and more of the value created is captured by the firm, not by the suppliers.

8 | DISCUSSION AND CONCLUSION

Our analysis is consistent with the intuition that firms can markedly benefit from collaborations with NGOs. However, we substantially qualify the conditions under which these benefits will accrue, with implications for firm's collaboration strategy with NGOs. We show that collaboration with NGO is usually preferable to internalization by the firm, especially for firms that have less bargaining power and when setting up a new supply chain requires higher investments. Firms and NGOs mutually benefit from collaboration especially when the NGO accepts lower value capture by the suppliers (implying more value capture for the firm) to meet its goal of broadening their access to the market.

There is nevertheless a flip side to the benefit of collaborating with an NGO. Our analysis reveals that firms are at risk of finding themselves in a "valley of frustration," capturing just enough value to justify establishing the new supply chain, but without hope of capturing more than this minimum amount of value. This situation arises when the NGO is making effort above its preferred level to ensure the formation of the supply chain, but as a result, tightly controls its effort. As a result, the firm does not capture more than the minimum necessary.

While the firm is not losing money in this situation and earns normal returns, it remains the actor benefiting the least from the increase in economic surplus. The effect on the firm's profitability remains negligible even though there is a tangible increase of value created. To avoid being stuck in the "valley of frustration," the firm needs not only to understand the NGO's goals, but also the NGO's capabilities, for it is a lack of capability, rendering its effort inefficient, that makes the NGO more likely to have to keep firm value capture at a low level. It is also possible that a firm satisfies itself with this situation once indirect benefits such as improved reputation are taken into account.

If NGO capabilities are key to firm performance, then there will be competition to secure access to better NGOs, as in any factor market. Our analysis shows that under competition, more capable NGOs will likely form collaborations with more powerful firms. This is counterintuitive as the more powerful firms will in turn strike a harder bargain with the suppliers, but this reflects the trade-offs that some NGOs may be willing to make in their quest to expand the reach of opportunities for suppliers. The implication is that having a strong bargaining power with respect to suppliers can be an asset to secure NGO collaboration when the NGO's objectives are broader than the value captured by supplier. However, this also implies that firms with lower bargaining power, that need NGO collaboration the most, may actually be outcompeted by firms with higher bargaining power and not see the benefits of the collaboration (ending up in the "valley of frustration").

Our model also suggests that empirical research on the determinants of firm-NGO collaboration should account for the forces driving the matching process. Selection implies that certain pairings are not viable, and therefore, not observed, while competition for matches will endogenously create correlations between matched firms and NGOs. This could be empirically tested using empirical matching models (Mindruta, Moeen, & Agarwal, 2016) and by paying detailed attention to the matching process itself (Gatignon & Capron, 2016). Understanding this matters because such patterns of association could also be thought of as being the result of assortative matching between organizations of high status in their respective domain.

We found a series of counterintuitive implications from the analyses of the trade-offs faced by the NGOs. While prior research has mostly focused on the divergence of firms' and NGOs' goals, our model implies that there can be some alignment between firms and NGOs, while NGOs' goals may be less aligned with those of suppliers than commonly assumed. In this vein, Lyon (2010) mentioned that different NGOs place different emphasis on the elements of the "triple bottom line"—people, planet, and profits. In our model, the NGO puts most emphasis on the "planet dimension." This means that suppliers' economic interests could be found to be somewhat ignored in spite of large NGO involvement. For example, The Nature Conservancy, along with other environmental NGOs, was highly supportive when Cargill International insisted on the implementation of the non-deforestation rule for soy farmers in Brazil, which required natural vegetation to be preserved on 80% percent of the farmer's land. However, this posed a major challenge to small farmers struggling to make a living out of only one fifth of their property. In the words of a farmer: "We feel oppressed. The NGOs call us criminals. But we don't want to work outside of the law [...]. And we came here after the forest had been cut down, and just took advantage of what we found" (McCarthy, 2007).

Furthermore, our model implies that the value split between the firm and the supplier cannot be understood independently of the NGO's characteristics, in particular, the NGO's capabilities as modeled by the cost of effort parameter μ . Because the NGO is willing to make trade-offs between its effort and the value appropriation by the supplier, ignoring the NGO's cost of effort may lead to misunderstanding the reasons behind certain choices. For instance, one may explain the choice of many coffee retailers to collaborate with the environmentalist NGO Rainforest Alliance rather than the Fair-trade Foundation as due to the former not requiring a minimum price to be paid to the supplier (McAllister, 2004). However, our model shows that it may sometimes be necessary to allow the firm to capture higher value in order to enable the collaboration to happen.

It is important to clarify how the NGO deals with the pre-existing market failure. In our model, the firm and the supplier are not able to credibly commit *ex ante* on how they split the value created *ex post*. This, combined with lack of contractibility, creates the conditions for a market failure. In the base model, the NGO does not solve the root cause, but "greases the wheels" by creating more value in the system to make the firm and the suppliers nevertheless work with each other. In the extensions, we explore some ways in which the NGO is acting more fundamentally on the root causes. For instance, the NGO may be guaranteeing a certain division of value *ex post* by affecting the parameter α_F , or may be transferring funds *ex ante* to get over the lack of contractibility between firm and suppliers. In these cases, the NGO is solving the market failure by fundamentally altering which contractual agreements are available.

From a modeling standpoint, the NGO acts similarly to a private regulator in the same manner as a welfare-maximizing regulator proposes and enforces contracts to shape the behavior of private firms (Laffont & Tirole, 1993). However, as in recent work in CSR (De Bettignies & Robinson, 2015), we model actors that are neither profit- nor welfare-maximizing. For instance, while related, the NGO's goals are distinct from the welfare of the suppliers. Moreover, since our model marries features from the value-based perspective (Brandenburger & Stuart, 1996, 2007) with some of private politics literature (Baron & Diermeier, 2007), we are able to study the interplay between fundamental features of the market (e.g., potential for value creation), and of the main players (e.g., firm bargaining power, NGO efficiency), and how they influence value creation and capture.

In conclusion, we offer a formal analysis of an NGO's contribution to value creation in a supply chain given the need to induce collaboration between firms and suppliers, and the specific goals of the NGO. Our formal model offers fresh insights for firm strategy and the empirical study of how

firms and NGOs collaborate to create economic value in spite of differences in goals. It offers testable hypotheses with respect to the reciprocal influence of key parameters on firm and NGO behavior, but it also provides novel insights with respect to sources of endogeneity and sample selection. We hope this research will foster more formal analyses of firm-NGO interactions incorporating a detailed value creation environment and expanding the repertoire of NGO and firm actions.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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