

You Are Judged by the Company You Keep:

Reputation Leverage in Vertically Related Markets*

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Abstract

This paper analyzes a mechanism through which a supplier of unknown quality can overcome its asymmetric information problem by selling via a downstream firm of reputable quality. The supplier's adverse selection problem can be solved if the downstream firm has established a reputation for delivering high quality vis-a-vis the supplier. The supplier may enter the market by initially renting the reputation of the downstream firm. The downstream firm may optimally source its input externally even though sourcing internally would be better in terms of productive efficiency. An entrant in the downstream market may lack reputation. As a consequence, it may suffer from a reputational barrier to entry arising from higher input costs.

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1 Introduction

This paper explores a mechanism through which a reputable downstream firm can leverage its reputation to procure its inputs cheaply in the presence of adverse selection among input suppliers and analyzes the implications for downstream barriers to entry. To fix ideas, consider a supplier whose product can be either directly sold to consumers or to downstream firms as an input. However, due to indivisibilities the supplier can not use multiple options. Indivisibilities arise if the supplier has to decide to whom to provide a design which is an extreme form of customization. Alternatively, due to contractual reasons, the expert may not allow the supplier to use multiple channels.¹ The supplier's capability to produce a high-quality product is unknown to consumers and is subject to adverse selection. In contrast, we assume that downstream firms have the ability to ascertain the quality of its input suppliers. This is a reasonable assumption in that small end users lack the knowledge and expertise to assess the quality of unknown suppliers' products while large industrial firms often have sufficient expertise that enables them to ascertain the quality of their business partners' product quality. The informational imperfection in the consumer market suggests that a reputation building process such as introductory pricing to signal its quality is necessary for this firm to sell a product to end consumers. One possible alternative to build a positive reputation is by providing inputs to a reputable downstream firm when high-quality inputs are essential to maintain the quality of the downstream stage product. Due to the necessity of high-quality inputs for a high-quality downstream product, the quality of the downstream product can be a signal of input quality. A downstream firm that is known to be of high quality can thus resolve the asymmetric information problem faced by the upstream firm.

Based on this mechanism, we develop a theory of entry barrier in which an incumbent's reputation serves as a mechanism to procure inputs at a lower cost – even at below the input suppliers' marginal cost – compared to potential entrants. This allows the incumbent to maintain the incumbency position even if a potential entrant is more efficient, thus creating a barrier to entry. The incumbent's advantage comes from its ability to “certify” the quality of input suppliers if they are subject to adverse selection due to uncertainty

¹We can extend to allow for multiple channels. In this case, in addition to the input price, which is linear in quantity, a fixed fee would need to be introduced to replicate our results.

about the quality of their products. We show that even if a potential entrant is equally capable as or more efficient than the incumbent in all aspects and its own product is not subject to any quality uncertainty once it is introduced to the market, the entrant is still unable to procure inputs as cheaply as the incumbent firm as long as its capability is *ex ante* unknown to the suppliers. When their own types are unknown the suppliers are concerned about the type of the entrant's purchasers. In contrast to our theory of entry barriers due to supplier concerns, reputational entry barriers in the existing literature arise due to consumer uncertainty about the quality of the product they buy, as will be discussed below.

We recall that the incumbent downstream firm is known to be a high-quality producer. This makes the input supplier a willing partner to the reputable downstream stage monopolist as its supplier relationship can be a signal of its quality, which enables it to charge a full price commensurate with its quality in the future. Now consider a potential entrant in the downstream market whose capability is unknown. In such a case, the input supplier is unwilling to sell to the potential entrant even if the potential entrant offers a higher price than the incumbent, because there is no assurance that its quality can be signaled in case the entrant fails to produce a high-quality product. We develop a model to explore how this mechanism in input procurement can put a potential downstream entrant at a disadvantage and create a barrier to entry.

The signaling mechanism we identified has additional implications. For instance, it uncovers a novel source of cost advantages for the incumbent firm and sheds new light on outsourcing decisions and dynamic brand development strategies for new firms.

There is by now a large literature on adverse selection and its implications for resource allocation. One strand of the literature explores implications of imperfect information on entry dynamics. Schmalensee (1982) and Farrell (1986), for instance, consider markets for experience goods in which buyers cannot verify the quality of an entrant's goods before actually buying and using them. They show how buyers' suspicion about the quality of an entrant's goods serves as an entry barrier due to the "fly-by-night" type entrant's incentives to engage in a hit-and-run strategy. As in Schmalensee (1982) and Farrell (1986), most papers in the literature on this topic assume that the quality of the entrant's product cannot be ascertained because it is an experience good. In contrast, we assume that the potential entrant is not subject to informational imperfection vis-a-vis consumers. We rather assume that the disadvantage for the entrant is the inability to convince potential input

suppliers of its capability when the input suppliers themselves need to establish a positive reputation. In a typical setting where a product is sold to end consumers, the sellers care only about the price they receive and the buyers' type is not of any concern to the sellers (whereas buyers may be concerned with the sellers' types). In our model, the success of the downstream market product can be a signal of the input suppliers' quality, and the input suppliers are concerned with the buyers' type when their own reputations are at stake. The informational problem at hand is the input suppliers' *ex ante* assessment of the downstream stage entrant's quality, not the buyers' assessment.

This paper is also closely related to the strand of literature that studies how reputable retailers can use reputation capital to vouch for an upstream partner's quality and mitigate the adverse selection problem. Chu and Chu (1994), for instance, show how manufacturers of high-quality products can use retailers' reputation to signal their quality whereas manufacturers of low-quality products distribute through discounters with no reputation. In a similar vein, Biglaiser (1993) explores the role of middlemen in a market as an agent to solve the adverse selection problem; see also Biglaiser and Friedman (1994). Alternatively, imperfect competition between upstream products can resolve adverse selection and moral hazard problems through the use of a common intermediary or a shared distribution channel (see Garella and Peitz, 2000 and 2007). Choi and Jeon (2007) develop a theory of co-branding as a mechanism to leverage one firm's reputation with another. They show that under certain conditions, co-branding that links unknown firms in a new sector with established firms in a mature sector allows the unknown firms to signal a high product quality and establish their own reputation. A related idea is developed in the literature on umbrella branding (e.g., Wernerfelt, 1988, Choi, 1998, Cabral, 2000, and Hakenes and Peitz, 2008) that investigates how a firm leverages its reputation capital with an existing product to signal the quality of its *own* new products, rather than "renting" its capital to other firms. Our model expands on these ideas and investigates how an incumbent can "certify" unknown input suppliers. The incumbent can use this leverage to procure inputs at a lower costs as suppliers are willing to sell at a lower price in return for the reputation boost. Potential entrants are at a disadvantage because they are unable to provide such an ancillary service.

In our model, the incumbent plays the dual role of input purchaser *cum* "certification intermediary." In this sense, this paper is related to Lizzeri (1999) and Albano and Lizzeri (2001). Lizzeri (1991) analyzes the role of certification intermediaries in a model of adverse

selection. His focus is on the strategic manipulation of information by certification intermediaries and shows that the optimal choice for the intermediaries often entails no disclosure or partial closure in the form of minimum quality certification. Albano and Lizzeri (2001) extend the analysis of Lizzeri (1999) to investigate the effects of a certification intermediary on the sellers' incentives to produce quality goods. They analyze the issue of the optimal degree of information revelation and show that the presence of an intermediary enhances efficiency by increasing the sellers' incentives to provide high quality even though the quality is underprovided in equilibrium relative to the full information first best. In their analysis on the role of intermediaries, they assume that the intermediary can credibly *commit* to a disclosure rule to maximize their profits. In a sense, the downstream firm in our model has more credibility in its ability to certify the quality because its own reputation is at stake.

Johnson (2012) develops a related idea in the context of exclusive dealing based on a similar informational structure. In particular, he assumes that retailers are in a better position than consumers to ascertain the quality of a new product. He shows that the upstream incumbent may profit from a partially exclusionary dealing policy that contracts with only high reputation retailers. Essentially, the contract blocks the channel that a potential entrant may use to signal its quality. We similarly assume that downstream firms possess superior information about trading partners compared to consumers. However, the mechanism at work in our model is very different from Johnson's. In Johnson's model, partial exclusion is an entry-detering strategy utilized by the upstream incumbent to deny a potential entrant access to the reputation capital of downstream retailers. In contrast, our model focuses on the disadvantage faced by a potential downstream entrant, which arises from the upstream firms' uncertainty about the capability of the entrant and their reluctance to supply when their reputations are at stake.

The remainder of the paper is organized in the following way. Section 2 sets up a basic model of adverse selection in which a firm of unknown quality can only sell directly to consumers. In Section 3 we introduce a second distribution channel which can be used to signal quality. Thus the firm can sell its product to consumers directly with introductory pricing or to a reputable downstream firm, which then uses it as an input. We show that the downstream firm can use its reputation to resolve the asymmetric information problem faced by the seller and extract rents from the seller. Section 4 explores other contexts to which the mechanism developed in the paper can be applied. In Section 5, we enrich the

model to develop a theory of entry barrier in the downstream market. Section 6 presents extensions and Section 6 concludes.

2 Preliminaries: The Adverse Selection Problem of Sellers

2.1 The adverse selection problem

We consider a simple model of adverse selection with an experience good in which the quality of the product is initially private information of sellers. We consider a two-period model in which the quality of the product is revealed at the end of the first period once it is consumed. The quality of the product can be high or low. There are several buyers and a producer who is either a high type or a low type. The high-type producer is endowed with the ability to produce a high quality product while the low-type producer can only produce a low-quality product. Consumer valuation is θ for high quality and 0 for low quality.

The probability that a producer is of high type is given by $\alpha \in (0, 1)$. The discount factor is δ . Each seller can produce only 1 unit in each period. The high type has a production cost of c_H whereas the low type has a production cost of c_L with $c_H > c_L$. The higher cost for high-quality product can either represent a production cost or an opportunity cost as in Daughety and Reinganum (2005). For instance, all types of producers have the same production cost of c_L , but the high type has an option value at c_H , which represents the value of an alternative use for the product such as keeping the product as in Akerlof (1970). We assume that there are positive gains from trade for the high-quality product; i.e., $\theta > c_H$.

When the quality of the product is high and consumers are informed of its quality, the seller can command a price of θ . As the high-type producer is more profitable than the low-type producer, a sacrifice of profits by introductory pricing or dissipative advertising can be a signal to buyers that quality is high (see e.g. Milgrom and Roberts, 1986).

The timing of the game is as follows: First, the firm privately learns its type and then decides whether to produce high quality when it is the high type. In period 1, it sets the period-1 price. Consumers observe the period-1 price and update their beliefs about product quality. Then, they make their purchase decision and all consumers observe product quality in case of purchase. In period 2 the seller sets the period-2 price. Then, consumers make their purchase decision. Depending on the parameter values, we can have different market equilibria (we consider Perfect Bayesian Equilibria throughout this paper).

2.2 Separating equilibrium

Consider a separating equilibrium in which the seller type can be revealed in equilibrium by introductory pricing. In such an equilibrium, the high type needs to charge a price $p_1 \leq c_L$ to signal that its quality is high and deter the low type's incentives to mimic. In the second period, consumers know its quality and the high type can command a price of θ , with an overall profit of

$$\pi_H = (p_1 - c_H) + \delta(\theta - c_H) = -\Delta_c + \delta(\theta - c_H),$$

where $\Delta_c = c_H - c_L$. For a separating equilibrium to exist, we thus need the following condition:

$$\delta(\theta - c_H) \geq \Delta_c \tag{1}$$

The high type firm makes a loss of Δ_c in the first period to signal its quality with an introductory pricing, which needs to be made up by the future profit when its quality is revealed. The condition says that the high type firm's second period profit is sufficiently high to recoup the first period loss. In the separating equilibrium, only the high quality product is sold in both periods and the low quality firm is unable to sell. If the separating equilibrium exists, it is also efficient.

2.3 Pooling equilibrium

In a pooling equilibrium or in a game where consumers bid up the price, no signaling through price is possible. In the equilibrium, both types of firms sell in the market and consumers cannot distinguish one from another before consuming the product. Consumers are willing to pay only up to the expected value of the product, which is given by $p_1 = \alpha\theta$. In the second period, the quality is revealed with high quality commanding a price of θ , whereas the low quality firm exits from the market. For a pooling equilibrium to exist, we need two conditions:

$$p_1 = \alpha\theta \geq c_L \tag{2}$$

$$(\alpha\theta - c_H) + \delta(\theta - c_H) \geq 0 \tag{3}$$

The first condition above is the incentive compatibility condition for the low type and the second is for the high type.²

2.4 Market collapse with no trade

If the high type firm cannot overcome the adverse selection problem in the market there is no trade. This would be the case if the production cost of the high quality product is close to the value of the product θ , relatively large compared to c_L , and the probability of the high type, α , is low.

3 Selling through an expert downstream firm with reputational leverage

3.1 Setting and main result

We introduce another channel through which a producer can signal its quality. More specifically, we assume that the product can also be used as an input to a downstream firm. The producer cannot serve the consumer market and a downstream firm at the same time; this assumption is obviously satisfied with a single unit to be sold in each period. More generally, the rationale for this assumption is that the production of an input for a particular downstream firm requires customization to fit with the exact specifications of the final product it is designed for.³

We make an important assumption about the informational structure of the game; unlike consumers, the downstream firm can ascertain the input supplier's quality. This is a reasonable assumption because the downstream firm may have enough expertise to evaluate the product unlike less sophisticated consumers. However, as we will argue at the end of this subsection, our main argument does not rely on this assumption.

The downstream firms can also be of two types. The quality of the downstream product or service can also be either high or low. The quality of the supplier's product and the

²If $c_H = c_L = c$, the IC condition for the high type is automatically satisfied if the IC condition for the low type holds. If condition (3) is not satisfied while (4) is, then there is a semi-separating equilibrium in which the market price of the input is realized at c_L with the low type firm selling with a probability of $\alpha(\theta - c_L)/[(1 - \alpha)c_L]$ whereas the high type firm always selling.

³We assume that customization can be adjusted in each period and does not affect the quality of the product.

product or service provided by the downstream firm are supposed to be complementary in the following sense: Regardless of the downstream firm's type, if the input quality is low, the downstream product quality is also low. Thus, a high-quality input is a necessary condition for a high-quality downstream product. If the input quality is high, it is certain that the high type downstream firm can produce a high-quality product that has a value of θ . However, if the downstream firm's type is low, it can produce a high-quality product with only a probability of $\rho \in (0, 1)$ even though the input is of high quality. The idea here is that a low-quality downstream firm endangers the proper functioning of the supplier's product. This implies that when the downstream product turns out to be of high quality, it proves that the input must be of high quality. Selling through a low-quality downstream firm carries the risk that a high-quality product of the supplier does not work properly which inhibits the supplier from reaping the benefits of its high-quality product in the second period. Hence, selling through a reputable downstream firm provides another channel to signal the input quality.

The timing of events is the following: The producer privately learns its type; the downstream firm's type is publicly known (reputable downstream firm). If the producer is of high type it decides whether to produce high quality. The producer's quality is observed by the downstream firm, but not by consumers. Producer and downstream firm bargain efficiently about the input price. In particular, we focus on the special case in which the downstream firm makes a take-it-or-leave-it offer and, thus, has the full bargaining power. The producer may sell directly to consumers, in which case it sets the retail price or sell the product as an input to the downstream firm, in which case the downstream firm sets the retail price. In the first period, consumers observe the identity of the seller and the retail price and update their belief about product quality based on this observation. They then make their purchase decision after which product quality is revealed. In the second period, the producer again has the choice to sell directly or via the downstream firm. However, we can discard the latter option since under full information the producer cannot lose from selling directly.

For now, we just assume that the high type downstream firm always makes a high quality product with the purchase of high quality input. This could be due to high reputation costs of the downstream firm which makes a deviation with low quality product provision unprofitable or the quality of the downstream product is an inspection good, which makes

the selling of low quality good infeasible. Then, the high-type input supplier knows that by supplying to the high-type downstream firm, it can signal its quality to consumers, and thus command a price of θ in the second period. This implies that the high-quality input supplier is willing to supply to the reputable downstream firm at any price higher or equal to the price with which it can signal its quality, that is, $p_D \geq p_1$ where p_1 is lower than the production cost. Let us assume that the downstream firm has an independent source of its input that can be procured at the cost of γ . If $p_1 < \gamma$, this alternative signaling mechanism also implies that the incumbent firm with a reputation is able to purchase the high-quality input at the price of $p_1 (< \gamma)$ due to its ability to certify the quality of the input. We summarize our finding in the following proposition.

Proposition 1 *Under efficient bargaining between producer and downstream firm, a reputable downstream firm purchases the producer's input in the first period unless it is much more efficient producing internally (such that $\gamma < p_1$). If $p_1 > \gamma$ and the downstream firm makes a take-it-or-leave-it offer, the producer sells the input to the downstream firm at a price below cost c_H in the first period and sells directly in the second period.*

So far we assumed that the downstream firm observes the quality of the input. Note, however, that we can dispense of this assumption when the downstream firm makes a take-it-or-leave-it offer that will always be rejected by a low-quality producer, but will be accepted by the high-quality producer, and gives positive rents for the downstream firm. This is always the case if a separating equilibrium is played in case of direct selling by the producer. Here, the downstream firm screens between high and low-quality producers by offering an input price less than c_L . If this price is weakly higher than the retail price set by the producer in the subgame in which it sells directly, then indeed the three conditions are met.

3.2 Welfare implications

We explore welfare implications of the availability of quality signaling mechanism through a supply relationship with a reputable firm compared to the case in which introductory pricing is the only way to signal quality. To this purpose, let us assume that the downstream firm has an independent source of its input that can be procured at the cost of γ . To reduce the number of cases to consider, let us assume that $\gamma < \theta$. This assumption implies that the

most efficient use of the product we consider is to supply to end consumers rather than using it as an input for a downstream firm. The welfare implications of reputation leverage hinges crucially on whether the market collapses due to adverse selection when only introductory pricing is available, and if the market survives adverse selection, whether the equilibrium is separating or pooling.

If the market collapses due to adverse selection, the availability of alternative signaling mechanism with reputation leverage is unambiguously welfare-enhancing. This would occur if

$$\begin{aligned} \delta(\theta - c_H) &< (c_H - c_L) \text{ and } \alpha < \alpha^* = \frac{c_H}{\theta} \\ \hat{p}_1 &= c_H - \delta(\theta - c_H) < \gamma \end{aligned}$$

The first two inequalities are the conditions for both separating and pooling equilibria fail to exist, respectively, which leads to a market collapse when quality can be signalled only with the price instrument. The third inequality is the condition that outsourcing is more cost effective for the downstream firm with reputation.

With our assumption that $\gamma < \theta$, signaling by supplying to a reputable downstream firm is welfare-reducing if the market equilibrium is characterized by a separating equilibrium. The reputable downstream firm's input acquisition from an unestablished supplier is purely a rent extraction device that diverts resources from the more productive use. The consumers are worse off and the downstream firm is better off, whereas the upstream firm is indifferent when the downstream firm makes a take-it-or-leave-it offer.⁴

If the equilibrium with introductory pricing is a pooling one, and reputation leverage with a downstream firm is also feasible, the welfare effects depends on the a priori probability of the high type (α). With our assumption that the production of the low quality product is inefficient, a pooling equilibrium entails inefficiency, which increases with the probability of being a low type ($1 - \alpha$). The conditions that there to be a pooling equilibrium is given by inequalities (??) and (??). In addition, for reputation leverage mechanism to be effective, we need $\gamma > \alpha\theta$. Taken together, the condition for a pooling equilibrium to exist and for

⁴If we assume that the upstream firm has some bargaining power and the input acquisition price is negotiated, then both the upstream firm and the downstream firm will be better off at the expense of consumers.

the reputation leverage mechanism to be relevant is given by:

$$\max \left[\frac{c_L}{\theta}, \frac{c_H - \delta(\theta - c_H)}{\theta} \right] < \alpha < \frac{\gamma}{\theta}$$

To compare welfare under introductory pricing and reputation leverage, all we need is to compare the first period social surplus. With a pooling equilibrium, the expected surplus in the first period is given by $\alpha\theta - [\alpha c_H + (1 - \alpha)c_L]$. When the product can be sold as an input to a reputable downstream firm, the reputable firm can always offer a price that is acceptable to the high quality firm as long as $\gamma > \alpha\theta$. Thus, if a producer does not supply to the reputable downstream firm, it is considered as a low quality producer. As a result, the availability of an alternative signaling mechanism can eliminate the inefficient production of low quality product in a pooling equilibrium. The total surplus with reputation leverage is given by $\alpha[\gamma - c_H]$. Thus, the availability of reputation leverage is welfare-enhancing if and only if $\alpha < \hat{\alpha} = c_L/(\theta - \gamma + c_L)$.

4 Applications

In the previous section, we demonstrated how the downstream firm can use its reputation (i.e., being known to be of high quality) to acquire its input cheaply. Our simple model has a couple of important applications, which we discuss below.

4.1 Outsourcing/Offshoring Decision

One of the most important decisions in procurement and supply chain management is a make-or-buy decision: what to produce internally and what to outsource? Some of the most cited benefits of outsourcing include economies of scale, risk pooling, and reduced capital investment. In particular, outsourcing allows a firm to focus on its core competency and provide opportunities to reduce costs by relying on outsiders who can aggregate multiple orders to reap the economies of scale (Simchi-Levi et al., 2008). Our model provides an interesting twist in the outsourcing decision. In our model, outsourcing can take place even when the firm is equally efficient or even more efficient than outsiders. The reason is that the input supplier is willing to supply below its cost to signal its quality. If the input supplier is a more efficient producer, outsourcing is inefficient. To see this possibility, we consider a simple variation of our basic model.

Instead of assuming that the production cost is the same for both types of input producers, let us assume that the high type has a production cost of c_H whereas the low type has a production cost of c_L with $c_H > c_L$. The higher cost for high-quality product can either represent a production cost or an opportunity cost as in Daughety and Reinganum (2005). For instance, all types of producers have the same production cost of c_L , but the high type has an option value at c_H , which represents the value of an alternative use for the product such as keeping the product as in Akerlof (1970).

Consider the separating equilibrium when the input supplier directly sells to consumers. Then, the high-type input supplier needs to sell at the price of $p_1 \leq c_L$ to signal its quality. For this signaling strategy to be viable, we assume that the high-type producers can recoup its loss in the first period with its second period profit, that is, $\delta(\theta - c_H) \geq (c_H - c_L)$. In addition, we assume that the downstream firm is able to produce a high quality input more efficiently at a cost of $c_I (< c_H)$.

Under such conditions, the downstream firm's input acquisition cost is c_L whereas its internal input acquisition cost is c_I . As long as $c_I > c_L$, the downstream firm would prefer to engage in outsourcing even though it can produce the input more efficiently. This provides a new rationale for outsourcing. The usual explanation for outsourcing is that the outside firms are simply more efficient and produce more cheaply. In our setting, outsourcing can take place even if the internal production is more efficient. Outsourcing is a mechanism to extract rents from willing partners who are eager to receive a seal of approval from reputable firms. From this we can interpret that the firm plays a dual role of input purchaser and quality-certifying intermediary.

We can derive qualitatively the same results when we analyze a pooling equilibrium or consider a game in which consumers bid up the price of the product until the price is equalized to consumers' willingness to pay as, e.g., in Tadelis (1999) and Cabral (2000) among others. If the pooling equilibrium prevails in the consumer market, the established firm can acquire its input at the price of $p_1 = \alpha\theta$. With this modification, it can be easily verified that all the remaining results hold as in the separating equilibrium. In particular, if $c_H > c_I > \alpha\theta (> c_L)$, the downstream firm has incentives to engage in outsourcing even if it has the capability to produce as efficiently as or more efficiently than the outside firm. It is cheaper to outsource at the price of $\alpha\theta$ rather than internally produce at the cost of c_I .

4.2 Dynamic Market Entry Strategy: From OEM to Brand Name

An OEM (original equipment manufacturer) is a firm that manufactures products or components to other companies to resell or to incorporate into a product that is then labeled under the purchasing company's brand name. Many firms from East Asia start out as an OEM for major firms and then later establish their own brand name. For instance, Samsung was initially an OEM but is now considered one of the world's leading brands in flat-panel screens and smartphones. In a similar vein, LG Electronics initially took OEM orders before establishing its own global brand in the international market. Kia Motors served as an OEM for Ford before selling cars under its own brand name overseas. Other examples include HTC, Huawei, and Lenovo (formerly Legend).

Our model suggests that this type of strategy is more effective when a firm is from a developing country. The usual explanation in the literature is that firms in developing countries often lack technical capability and effective production systems, which results in the production of low-end and poor-quality products. OEM contract arrangements with firms in advanced countries allow them to gain access to advanced production and technological skills, offering a vehicle to enter foreign markets and upgrade their capabilities. This process helps enhance the perceived quality and image of the firm's products, which enables them to eventually sell products under their own brand name (Cheng, et al., 2005). Gereffi (1999), for instance, provides a detailed analysis of the global apparel industry in which he documents the role of branded marketers that has been instrumental in upgrading overseas suppliers' technical and organizational capabilities. Our model provides an alternative mechanism through which being an OEM can be an effective strategy to enter foreign markets; even when firms already have sufficient capability to produce high-quality products and thus no technical learning is involved, OEM contracts can be valuable in facilitating future entry with own brand names by providing a "seal of approval" if consumers are uncertain about their capabilities to produce high-quality products.

To formally develop this idea, consider a situation in which introductory pricing to signal quality is too costly and thus there is no separating equilibrium. Once again, assume that high quality has a production cost of c_H whereas low quality has a production cost of c_L with $c_H > c_L$. The high-quality input supplier needs to sell at the price of $p_1 \leq c_L$ to signal its quality. If $\delta(\theta - c_H) < (c_H - c_L)$, high quality cannot recoup its loss from introductory

pricing in the future, and a separating equilibrium does not exist. In a pooling equilibrium, consumers are willing to pay only up to $\alpha\theta$. For a pooling equilibrium to exist, it is required that $\alpha\theta \geq c_H$. Thus, a pooling equilibrium exists only when the a priori probability of the high type, α , is sufficiently high, that is, $\alpha \geq \alpha^* = c_H/\theta$.

We can interpret α to reflect the overall technical capability of firms in an economy, with more advanced countries having a higher α . If a firm is based in a less developed country, consumers will associate the firm with a lower α . Thus, if $\delta(\theta - c_H) < (c_H - c_L)$ and $\alpha < \alpha^*$, there is no way for a firm of unknown quality to directly enter the consumer market. However, if there is an established firm that can purchase the output as an input, the firm may be able to enter the market. As before, we assume that the established firm can ascertain the quality of the product that can be used as an input. It can offer a price of $\hat{p}_1 = c_H - \delta(\theta - c_H)$, which is once again cheaper than the cost of internal production, even if the established firm is equally efficient as the outside input suppliers.⁵

Established firms that are able to ascertain and indirectly certify the quality of the OEM products can thus provide an alternative entry path for the supplying firm when direct entry to consumer markets is not feasible. This is more likely to hold for firms from developing countries and may explain why firms that make a transition from OEM to OBM (original brand manufacturers) are predominantly from developing countries. The price path is also consistent with the evidence that original brand manufacturers receive much higher margins compared to OEMs.⁶ The theory is also consistent with Ghosh and John's (2009) empirical finding that firms are more likely to choose branded component contracts when the supplier's brand name adds significant differentiation.

Case studies of OEM firms that made successful transitions to OBMs also document conflicts with their OEM customers when OEM firms cultivate their own brand names, with OEM customers threatening to reduce or withdraw OEM contracts (Yang and Wu, (2008) and Cheng et al. (2005)). This type of conflicts is often attributed to OEM clients' perception of OEMs as potential competitors once they establish their own brands. In our model, separation will take place even if there is no direct competition and the relationship

⁵If the input supplier has any bargaining power, then the input acquisition price will be somewhere between c_H and $c_H - \delta(\theta - c_H)$.

⁶Yang and Wu (2008) quote Gerhand Schen, general manager of Mingde Musik in China, as saying "[I]n the OEM business, you only get one-eighth of the pie, but with your own brand, you get a bigger chunk of the profits." According to one estimate,

is purely vertical; after establishing a reputation via OEM relationships, OEMs do not see any reason to supply at a low price when they are able to sell at a higher price in the open market. From the perspective of OEM clients, the cost of purchasing through OEMs with established reputations is simply too costly. Thus, the optimal strategy of OEM clients is to find another willing partner that needs to establish a reputation. Our model implies that OEM clients will use a revolving list of OEMs.

5 Reputational leverage and incumbency advantage

In this section we embed our mechanism in a model with potential downstream entry. There is an incumbent (I) in the downstream market whose type is known to be of high type. Then, the high-type input supplier knows that by supplying to the high-type downstream firm, it can signal its quality to consumers, and thus command a price of θ in the second period. This implies that the high-type input supplier is willing to supply to the reputable incumbent at any price higher or equal to the price with which it can signal its quality. In other words, the incumbent firm with a reputation is able to purchase the high-quality input at the price of $p_I = c_L$ due to its ability to certify the quality of the input. Let us assume that the incumbent's cost of production in addition to the input price is given by C .

There is a potential entrant (E) at the downstream stage who can decide to enter in period 0 at cost ε . It can be either of high type or low type. The potential entrant knows its type prior to entry but remains private information. Let $\beta \in (0, 1)$ be the *a priori* probability that the potential entrant is of high type. However, we assume that once the downstream product is produced, its quality can be ascertained by consumers. In other words, the downstream product is an inspection good. If the potential entrant produces a high-quality product, it does not need any introductory pricing to signal its quality and can command a price of θ in the market. Thus, the potential entrant does not face any disadvantage vis-a-vis the incumbent due to uncertainty about the quality of its own product. We thus rule out entry barrier created by the presence of "hit-and-run" entrants and abstract from the mechanism analyzed in Farrell (1986). The entrant at the downstream stage will certainly face additional barrier to entry if the product is an experience good. To focus on the entrant's disadvantage in the input market, we construct

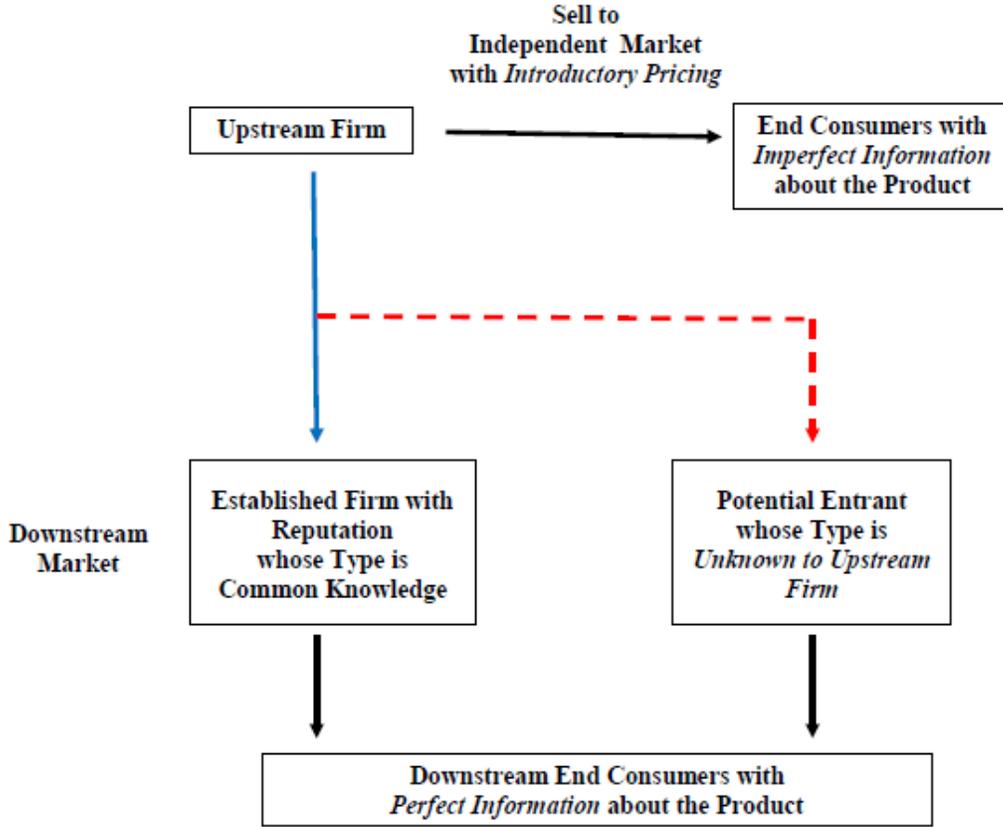


Figure 1: Alternative Mechanisms to Signal Quality and Information Structure

our model in such a way that all other potential channels of entry barrier are blocked and put the entrant on a level playing field with the incumbent. In this spirit, we also endow the entrant with the same ability to ascertain the input quality as the incumbent. The potential entrant has a production cost of $C_E < C$. This implies that potential entrant is a more efficient producer if it is of high type. Our set up is illustrated in Figure 1.

The entry barrier we identify in this model is the potential entrant's disadvantage in the input market. Can the potential entrant procure its input as cheaply as the incumbent? One assumption we adopt is that the input supplier does not know the potential entrant's type. Thus, there is asymmetry in the information structure before and after the entrant's production. Once a final product is produced by the entrant, its type can be revealed in the product market. However, before production takes place, there is no way for the input supplier to ascertain the entrant's type or the quality of its product. We assume that a

contract with the potential entrant that is contingent on the realized final product qualities is not feasible. The inability to write a contingent contract can be justified by the problems of verifiability in courts (Hart and Grossman, 1986; Hart and Moore, 1990).

We can consider two types of equilibrium in the input market facing the entrant whose type is unknown to the input supplier. We illustrate the idea of the incumbency advantage in the input market with the pooling equilibrium and show that the same insight remains valid in the separating equilibrium.

In a pooling equilibrium, the input supplier cannot distinguish the high type entrant from the low type and the downstream entrant pays the same input price regardless of its type. In such an equilibrium, the high-quality input supplier is willing to supply to the potential entrant only if

$$(p_E - c_H) + \delta[\beta + (1 - \beta)\rho](\theta - c_H) \geq \delta(\theta - c_H) - \Delta_c,$$

where p_E denotes the price paid by the potential entrant. The input supplier can signal its quality in the second period only when the potential entrant produces a high-quality product. Given the uncertainty about the potential entrant's type, the ex ante probability that a high-quality product will be produced by the entrant is given by $\beta + (1 - \beta)\rho$. Thus, the input acquisition cost for the potential entrant is $p_E = c_L + \delta(1 - \beta)(1 - \rho)(\theta - c_H) = p_I + \delta(1 - \beta)(1 - \rho)(\theta - c_H)$. In other words, the potential entrant needs to pay a premium of $\Delta = \delta(1 - \beta)(1 - \rho)(\theta - c_H)$ over the incumbent's acquisition price. The lower β and ρ , the higher the premium the potential entrant needs to pay.

For this to be an equilibrium input price for the potential entrant, the low-type entrants should be willing to pay this price. This requires

$$\begin{aligned} & \rho\theta - (p_E + C_E) \\ = & \rho\theta - [c_L + \delta(1 - \beta)(1 - \rho)(\theta - c_H) + C_E] \geq 0 \end{aligned}$$

This condition can be equivalently written as

$$\rho \geq \rho^* = \frac{C_E + c_L + \delta(1 - \beta)(\theta - c_H)}{\theta + \delta(1 - \beta)(\theta - c_H)}$$

The model suggests that even if the potential entrant is more efficient, the disadvantage

in its procurement cost may put it at an overall disadvantage if the input price premium it has to pay is high enough, that is, if the following condition holds:

$$\Delta > (C - C_E),$$

where $\Delta = \delta(1 - \beta)(1 - \rho)(\theta - c_H)$.

We summarize our finding by the following proposition:

Proposition 2 *Suppose that the input market for the potential entrant is characterized by a pooling equilibrium in which the potential entrant pays the same input price to the input supplier. Then the entrant who is more efficient than the incumbent downstream firm does not enter if $\Delta > (C - C_E)$.*

The same type of argument can be made for the separating equilibrium in the input market. In the separating equilibrium, the high type downstream entrant would be willing to pay up to $(\theta - C_E)$ whereas the low type firm will be willing to only up to $(\rho\theta - C_E)$. Thus, in a separating equilibrium, the high type firm can reveal its type by offering a price of $\rho\theta - C_E$. If $\rho\theta - C_E > c_L$, the entrant needs to pay a premium for the input and a more efficient entrant can be deterred.⁷

Our model thus provides a novel and unexplored channel through which the incumbent advantage can be obtained. Often the cost advantage of the incumbent is attributed to its ability to buy in bulk and monopsonic power. For instance, Apple's success and its huge margin on its products are often attributed to its "big discounts on parts, manufacturing capacity, and air freight" because of its volume and ruthlessness in bargaining.⁸ Our model suggests that another source of the low input price and its cost advantage can be Apple's ability to certify the quality of its input suppliers. Input suppliers can garner instant credibility by being designated as an Apple supplier, and they are willing to supply at a low price to establish themselves as a high-quality producer, which enables them to receive high prices in the market down the road.

⁷If $\rho\theta - C_E < c_L$, both the incumbent and the high type entrant pays the same price of c_L for the input.

⁸See Satariano and Burrows (2011).

6 Concluding Remarks

In this paper, we have developed the idea that a firm's customer relationships can signal the quality of its product. An incumbent can take advantage of this signaling mechanism and utilize its reputation to procure inputs at a lower cost than potential entrants. As a result, the incumbent is able to maintain the incumbency position even if the potential entrant is more efficient, thus creating an entry barrier. The incumbent's advantage comes from its ability to "certify" the quality of input suppliers if they are subject to adverse selection due to uncertainty about the quality of their products. This provides a new rationale for the incumbent advantage and the persistence of monopoly. We also explored how the mechanism considered in the paper can be applied to other contexts such as outsourcing and dynamic entry strategies for unknown brand names.

The mechanism can also be applied to young scholars' incentives to work with established scholars in their early careers. Choi and Jeon (2007) interpret the coauthoring relationship between young and established scholars in terms of co-branding in which coauthorship with established scholars can be used to signal a young scholar's ability. Of course, in the setting of collaboration in the academic market, there is no monetary price associated with the transactions. Instead, the division of workload may play the role of price in the relationship. One implication of the model is that young scholars will be willing to shoulder the bulk of work in the collaboration when they work with established scholars. In this sense, established scholars have a significant advantage vis-a-vis non-established ones in terms of productivity as the incumbent enjoys a cost advantage compared to potential entrants who do not have an established reputation.⁹

⁹To quote Nobel Laureate Zuckerman (1967, p. 396), ".. it clearly did my student... no harm at all to have me as a second author of the paper. It called people's attention to the paper who might otherwise not [have] read it at all... Nor as a matter of fact, did it do me any harm."

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