
**Input Markets and the
Strategic Organization
of the Firm**

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Abstract

Organizational structure of firms is an important topic that has been widely discussed in virtually all management disciplines. The typical view of firm organization emphasizes enhancing efficiency by fully aligning incentives of all participants to achieve a common objective. Over the years, research in accounting, economics, and marketing has stressed how competition in output markets can alter this view. More recently, there has been an emphasis on how a firm's concurrent participation in input markets, wherein strategic supplier considerations are in play, can further alter the traditional view of organizational structure. This monograph seeks to synthesize such results and present the key considerations and conclusions that can be gleaned from this research. In doing so, the monograph emphasizes implications for accounting but also stresses the inherent interconnectivity with issues in industrial organization, strategy, and regulation.

Contents

1	Introduction	1
2	Organizational Design When a Firm is a Buyer in Input Markets	11
2.1	Decentralization and Transfer Pricing	11
2.2	Measuring Segment Profitability	21
2.3	Implications for Industrial Organization	29
2.3.1	Licensing to Competitors	30
2.3.2	The Make-or-Buy Decision	37
3	Organizational Design When a Firm is a Seller in Input Markets	47
3.1	Decentralization and Transfer Pricing	48
3.2	Measuring Segment Profitability	60
3.3	Implications for Industrial Organization	65
3.3.1	Retail Encroachment and Time-to-Market	66
3.3.2	Quantity vs. Price Competition	71
4	Discussion	77
	References	93

1

Introduction

The strategic organization of firms has long been a prominent issue in management. Perspectives on firm organization are diverse, coming from many fields including economics, finance, marketing, operations, and organizational behavior. In each case, however, organizational design cannot be fully appreciated without an eye on accounting. After all, with decentralized organizations comes the necessity of measuring the success of separate business units. Such measurement calls upon the accountant to undertake a difficult task — creating independent measures of activity and performance for inherently interdependent business units. Such accounting measures, which form the crux of managerial accounting, require an appreciation of interconnectedness, both horizontal (among different operating segments) and vertical (among upstream and downstream segments).

The traditional view of accounting is one of the developing measures to track exogenous transactions. Over the years, however, accounting research has consistently stressed that the measurement system itself is part of the endogenous interlinkages that lead to such transactions. A case in point is the measurement of profitability for vertically related business units. Such measurements depend on the chosen transfer

2 *Introduction*

prices. But, of course, a firm's transfer pricing policy alters incentives of its divisions which, in turn, alters the transactions they undertake in the first place.

In accordance with such endogenous interlinkages, research in a variety of fields has shown that not only are internal relationships altered by performance measurement and compensation choices, but so are external relationships. Prominent examples include the strategic choice of incentive pay stressed in Fershtman and Judd (1987) and Sklivas (1987); the strategic use of transfer pricing in Alles and Datar (1998); strategic consequences of relative performance evaluation in Aggarwal and Samwick (1999); and strategic self-sabotage to soften competitive response in Sappington and Weisman (2005). In these research streams, a unifying theme arises stressing that the strategic view of firm organization and the measurement of the performance of various firm components are inextricably linked.

That said, research stressing the importance and ramifications of strategic considerations on firm organization is primarily focused on a firm's strategic relationship vis-a-vis output market competitors. Recent research, however, has widened the focus to the role of organizational structure on strategic relationships in input markets. It is this stream of research that the present monograph seeks to synthesize. In doing so, we classify the role of input markets on organizational design into two arenas: (a) Section 2 of this monograph examines how a firm's participation as a buyer in input markets affects existing perspectives of organizational design; and (b) Section 3 examines how a firm's participation as a seller in input markets alters prevailing views of organizational design.

In terms of a firm's role as a buyer in input markets, the presence of strategic considerations is unmistakable. Beginning with Spengler (1950), the consequences of supplier pricing on supply chain efficiency have been extensively studied and discussed. In various realms, strategic means of achieving coordination have been documented. For example, the use of quantity discounts (Jeuland and Shugan, 1983) or two-part tariffs (Moorthy, 1987) can help alleviate strained supply relationships, as long as such measures survive the scrutiny of anti-trust regulators. The creation of a direct sales channel

(Tsay and Agrawal, 2004), use of product returns (Pasternack, 1985), employment of more intricate quantity flexibility or revenue-sharing contracts (Tsay, 1999; Cachon and Lariviere, 2005), and enhanced market segmentation (Villas-Boas, 1998) have also been presented as strategic consequences of self-interested input supply.¹

The question addressed in the present monograph is how strategic firm organization and accounting measurements affect and are affected by such prevalent concerns of relying on an external input supplier. In this vein, we first address work on accounting issues, notably transfer pricing and measuring segment profitability. Section 2.1, based on Arya and Mittendorf (2007), discusses the consequences of external input supply for the transfer prices that govern internal input supply.

Traditional studies of external input supply ignore the presence of internal input supply; similarly, most studies of transfer pricing sidestep consideration of external input suppliers. Yet, the joint use of internal and external input supply is widespread. For example, computer manufacturers typically develop products that contain both their own hardware components and software provided by external parties. When both internal and external sources of inputs are relied upon, the typical views of each are altered. In particular, when the internal supply source is viewed alone, a centralized structure is preferred. Yet, when both supply sources are considered jointly, it is shown that a decentralized organization that employs transfer prices above marginal cost is preferred.

The intuition for this result comes from the fact that the firm seeks to convey a low willingness to pay for inputs provided by external parties. While higher costs and greater inefficiencies can be one means of doing so, a firm finds it much more attractive to employ higher pseudo-costs. That is, transfer prices above marginal cost create a circumstance where the firm's procurement division behaves as if it has excessive costs without the firm actually having to incur such excessive costs in a real sense. This posture, in turn, convinces the external supplier to cut its own price, thereby benefiting the firm. While in

¹ For a review of the literature on supply chain coordination and the myriad of contracting solutions, see Lariviere (1998).

4 *Introduction*

isolation the view of the decentralized firm with high transfer prices seemingly paints the picture of inefficiency, it turns out that painting this picture is itself a sign of firm efficiency. In effect, the results underscore the notion that modest internal frictions in a firm can serve as an effective brake on exploitative external parties.

Turning to segment profitability considerations, Section 2.2 addresses implications of a reliance on external input supply for the measurement of the performance of divisions located in distinct output markets. As detailed in Arya and Mittendorf (2010c), a firm's use of an externally generated input for diverse internal segments introduces complexity in the profit measurement of each individual segment. Circumstances of this sort are widespread: large grocery chains engage in central procurement of inputs but track profits of individual retail stores; Apple uses externally purchased flash memory for a variety of its products (iPod, iPhone, iPad); retailers make wholesale purchases which are distributed through both traditional brick-and-mortar outlets as well as online retail arms; etc. In such circumstances, it is demonstrated that the traditional accounting for segment profits understates the performance of low-margin segments and overstates performance of high-margin segments. Intuitively, the presence of low-margin segments helps convey a lower ability to pay to suppliers which, in turn, creates downward pressure on wholesale prices. The benefit of such low wholesale prices is borne primarily by the more svelte high-margin segments. In other words, traditional accounting of segments fails to incorporate the latent subsidy underperforming segments provide to overperforming segments. This viewpoint, firmly rooted in supply-side strategic complementarity across segments, has an analog in the realm of demand-side complementarity. That is, while the ideas of loss leaders, predatory pricing, and freebie marketing (e.g., the use of cheap or even free razors to capture captive consumers for blade lines) have long been discussed as key demand-side considerations, the appreciation of related supply-side complementarities is in its infancy.

To further develop the ramifications of strategic input supply, in Section 2.3 we pivot away from issues of accounting measurement to issues of industrial organization. In Section 2.3.1, we note that the reliance on an external supplier may in fact create a demand for the

firm to promote modest external competition via judicious licensing to rivals. In particular, Arya and Mittendorf (2006b) show that when a firm relies on an external supplier for key inputs, it can use licensing with royalty fees to create a de facto surrogate with inherently lower ability to pay for external inputs. Not only do royalties serve to lower the surrogate's willingness to pay, but they also serve as a means through which such wholesale pricing gains are siphoned back to the firm. As such, input markets change the traditional views of firms' willingness to foster (and even create) output market rivalries.

Even when output market rivalries are inevitable, Section 2.3.2 discusses how the presence of an external supplier can change a firm's strategic posturing. As demonstrated in Arya et al. (2008a), the organization of a firm in terms of the make-or-buy decision is altered by a rival's reliance on an external supplier. In effect, given a rival relies on a particular supplier, a firm's decision to internally make an input creates a de facto strategic partnership between the rival and its supplier. This alliance manifests itself in the supplier offering lower input prices to support its sole customer's desire to extract a greater share of the output market (and, by proxy, help the supplier profit more in the input market). If, instead, the firm opts to procure inputs from the external supplier, the firm undercuts the supplier-rival partnership since now both the firm and rival are customers of the supplier. As a consequence, the supplier responds by boosting the rival's input price. The strategic benefit of raising the rival's input price can justify a firm's reliance on a common supplier even when the firm can make inputs at a price below the prevailing external input price.

Though each of the above circumstances focuses on a firm's role as a buyer in input markets, the influence of input market on strategic organization of firms also extends to a firm's role as a seller in input markets, which forms the basis for Section 3 of this monograph. Firms' concurrent roles as sellers in both input and output markets have been studied in economics (e.g., Gallini and Lutz, 1992; Dutta et al., 1995), marketing (e.g., Kalnins, 2004; Vinhas and Anderson, 2005), and operations (e.g., Chiang et al., 2003; Tsay and Agrawal, 2004). The practical importance of this issue has reached a fever pitch with the proliferation of manufacturer-direct online sales arms concurrent with

6 *Introduction*

traditional retail channels (e.g., Tedeschi, 2005). The issue of interest herein, which has only garnered interest in recent years, is how such industrial structures affect and are affected by strategic organization of firms.

As with Section 2, Section 3 begins with a discussion of ramifications for the preeminent managerial accounting topic of transfer pricing. In particular, Section 3.1 revisits the strategic role of transfer pricing when the internal input supplier also serves as an external input supplier. Importantly, such external input supply eventually finds its way to competition with the output produced internally. That is, while the presence of and participation in external input markets is well studied in the transfer pricing literature (e.g., Hirshleifer, 1956; Baldenius and Reichelstein, 2006; Arya and Mittendorf, 2008), only recently has such research considered the role such externally sold inputs play in eventual output market competition for internally generated outputs. In the parlance of industrial organization, the interest here is to examine transfer pricing when the firm is a vertically integrated producer (VIP). To elaborate, Arya et al. (2008c) consider how a firm's role as a VIP affects and is affected by transfer pricing. That is, as a VIP, a firm's inputs sold externally become competing products for the outputs produced internally.

In this case, the VIP seeks to balance its profits in wholesale markets (external input supply) and its profits in retail markets (external output supply), where such markets are inherently linked. Under a centralized structure, the firm finds such balance difficult to achieve. After all, once wholesale demand is satisfied, the firm may find itself overly aggressive in retail competition. We say "overly aggressive" since its wholesale customer can rationally foresee such a competitive response and will be less willing to pay a premium in the wholesale market. This undesirable retail posture is consistent with empirical studies of territorial encroachment (e.g., Kalnins, 2004). As such, a savvy firm will seek to find means to convince its wholesale customer that it will not excessively cannibalize the retail market.

It is this desire to convey a softer competitive posture in the retail market that creates a demand for decentralization. A decentralized organization that employs transfer prices above marginal cost gives the

firm a credible means to convince its wholesale customer that its own retail arm will not excessively undercut the customer's retail margins. Doing so of course costs the firm to an extent in the retail market, but such losses are more than compensated for in wholesale profit gains. Interestingly, and in contrast to existing theoretical work on transfer pricing policies, the preferred transfer pricing terms can be realized by a well-designed negotiation process even when the central planner does not have access to all relevant information about the relative attractiveness of the wholesale and retail markets.

The concurrent participation in wholesale and retail markets also has implications for segment profit calculations even in the absence of transfer pricing and/or decentralization. In particular, Section 3.2 identifies that if a centralized firm were to conduct both retail and wholesale operations as a VIP, the seemingly distinct segments exhibit a key interdependency. If the retail arm suffers efficiency setbacks, such changes have distinct reverberations on wholesale operations. The reduced retail efficiency emboldens retail rivals which, in turn, boosts wholesale demand. For this reason, reduced efficiency at the retail level results in lower retail profits but also higher wholesale profits. The net effect may actually be an increase in overall firm profits, suggesting that modest retail inefficiency may be something a well-organized firm will turn a blind eye to. Connecting this to the key forces identified in Section 3.1, a common theme arises in that both point to upsides of retail weakness. Decentralization and transfer pricing represent a unique way to achieve this weakness, as they do so with higher pseudo-costs instead of actual costs. As such, the use of transfer pricing to achieve wholesale market objectives achieves such goals without imposing substantial real costs.

The retail firm's added role as an input supplier also has ramifications beyond accounting measurement to industrial organization, which forms the focus for Section 3.3. In Section 3.3.1, we revisit the traditional question of time-to-market. The usual view is that there is a strong strategic advantage for a firm when it is a Stackelberg leader in the retail market. The well-studied Stackelberg game has been used to explain a variety of practices including investments in logistics, point-of-sale information networks, and streamlined distribution systems (Kulatilaka and Perotti, 2000). In the case of

8 *Introduction*

dual participation in retail and wholesale markets as a VIP, however, the traditional Stackelberg advantage is reversed. Though Stackelberg leadership offers an opportunity to drive out competition, doing so only magnifies the concerns of encroachment on wholesale customer territory. As a Stackelberg follower, however, the VIP provides its wholesale customer a means through which it can gain a retail advantage. Further, this means requires the wholesale customer to procure additional wholesale units. It is this spillover to wholesale markets that can favor a slower time to market, despite the concomitant (but relatively muted) retail downside.

Joint participation in input and output markets can alter even the most widely held views of industrial organization and regulation. Perhaps the most fundamental result in modeling of retail competition is the notion that price (Bertrand) competition is much more competitive than quantity (Cournot) competition. This common view has been shown to be robust to a variety of modeling perturbations (e.g., Singh and Vives, 1984; Okuguchi, 1987; Vives, 2005). As shown in Arya et al. (2008b), and summarized in Section 3.3.2, the presence of a VIP adds a distinct wrinkle to the standard view.

To elaborate, under Cournot competition, a VIP takes its rival's quantity as given when choosing its own retail quantity. In other words, the VIP ignores wholesale profit when choosing retail quantities. The result is much more intense competition than the firm would like. In contrast, under Bertrand competition, only the rival's retail price is taken as given when the firm chooses its own strategic posture (i.e., retail price). As a result, the VIP realizes that a decrease in its own retail price to gain advantage over its competition will inevitably reduce wholesale demand for its inputs. As a result, the firm is less willing to cut its retail price. The end result is that with a VIP, the retail market is less competitive under Bertrand competition. Further, this muted competition translates into lower consumer surplus and total surplus, suggesting that if regulators are seeking to promote efficiency in imperfectly competitive markets, the low hanging fruit may actually lie in markets characterized by price competition.

Taken together, the various results noted above paint a more nuanced picture of a well-organized firm with effective accounting

measurement than reflected in conventional wisdom. Relative to the strong emphasis on how output markets alter views of strategic firm organization, an appreciation for how input markets alter these views is in its early stages. Nonetheless, the work summarized herein provides a broad view of both the scope and scale of such ramifications.

One last note before we begin with the particulars. By intention, this monograph is focused on research for which we have been (at least a subset of) the authors. This focus on our own research is not intended to reflect that we believe it is the most important, only the most familiar. To the best of our abilities, we have discussed related literature in the field and tied the papers focused on here with others that are related. Despite our sincere efforts in this regard, we suspect we have overlooked some related papers of which we are unaware. For this, we offer our deepest regrets in advance.

With the above caveat duly noted, the monograph proceeds as follows. Section 2 examines how participation as a buyer in input markets can change views of optimal firm organization. Section 2.1 investigates decentralization and preferred transfer pricing; Section 2.2 studies segment profit measurement; and Section 2.3 details ramifications for industrial organization. Section 3 examines how participation as a seller in input markets alters views of strategic firm organization. Section 3.1 revisits decentralization and transfer pricing; Section 3.2 looks at segment profit measurement; and Section 3.3 examines implications for industrial organization. Section 4 then concludes the monograph while providing a discussion of additional considerations and unanswered questions.

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