Internal Pricing

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Boston – Delft

Foundations and Trends® in Accounting

Published, sold and distributed by:
now Publishers Inc.
PO Box 1024
Hanover, MA 02339
USA
Tel. +1-781-985-4510
www.nowpublishers.com
sales@nowpublishers.com

Outside North America:
now Publishers Inc.
PO Box 179
2600 AD Delft
The Netherlands
Tel. +31-6-51115274

The preferred citation for this publication is T. Baldenius, Internal Pricing, Foundation and Trends® in Accounting, vol 3, no 4, pp 223–313, 2008

ISBN: 978-1-60198-270-4

Foundations and Trends® in Accounting
Volume 3 Issue 4, 2008

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Foundations and Trends® in Accounting, 2008, Volume 3, 4 issues. ISSN paper version 1554-0642. ISSN online version 1554-0650. Also available as a combined paper and online subscription.

Foundations and Trends® in
Accounting
Vol. 3, No. 4 (2008) 223–313

DOI: 10.1561/1400000013

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Internal Pricing*

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Abstract

This monograph focuses on the use of incomplete contracting models to study transfer pricing. Intrafirm pricing mechanisms affect division managers' incentives to trade intermediate products and to undertake relationship-specific investments so as to increase the gains from trade. Letting managers negotiate over the transaction is known to cause holdup (underinvestment) problems. Yet, in the absence of external markets, negotiations frequently outperform cost-based mechanisms, because negotiations aggregate cost and revenue information more efficiently into prices. This result is established in a symmetric information setting and confirmed, with some qualification, for bargaining under incomplete information. In the latter case, trading and investment efficiency can be improved by adding non-financial performance measures to a divisional performance measurement system. When the intermediate product can also be sold in an imperfectly competitive external market, internal discounts on external market prices are shown often to improve the efficiency of intrafirm trade and of upfront investments.

* The author would like to thank Brian Mittendorf (the reviewer), Neale O'Connor and Stefan Reichelstein for their helpful comments.

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Introduction

Evaluating the performance of divisional managers is a key issue in decentralized firms. Compensation for these managers is based for the most part on divisional profit metrics. Disaggregating firmwide into divisional performance, however, is often complicated by intrafirm trade. Ultimately one division will book the revenues when a final product is sold, yet the value thus created may be determined to a large extent by intermediate goods and services provided by many divisions. Without proper internal pricing schemes to account for these resources, the contributing divisions will have little or no incentives to render any (high quality) inputs. This monograph proposes an incomplete contracting model to evaluate the strengths and weaknesses of commonly used pricing schemes.

The Arrow–Debreu mechanism efficiently aggregates valuations of market participants into market-clearing prices. Yet, two of the underlying assumptions — atomistic buyers and sellers, and homogeneous goods — are generally violated for intrafirm transactions. The reasons for firms to vertically integrate often revolve around specialized (non-commoditized) inputs and less than competitive markets to

source these inputs from.[1] Purchasing such inputs from external sources requires paying monopoly rents or risking information spillage in case of proprietary technologies. Within vertically integrated firms, there are typically a small number of sellers and buyers for any given input; in fact, the extreme case of bilateral monopoly is common. It is well-known that a laissez-faire mechanism performs less well in such "thin" markets (Myerson and Satterthwaite, 1983).

In his classic study, Hirshleifer (1956) has shown that pricing intermediate products at marginal cost — broadly defined to include opportunity costs if the intermediate good is traded externally — achieves full efficiency. While conceptually important, this result is of limited practical value as the firm's central office (hereafter, HQ) typically lacks the information necessary to determine marginal cost at the product level. Commonly used transfer pricing mechanisms therefore are more decentralized in nature and fall into three broad categories: negotiated, cost-based, and market-based.[2] HQ's role is to choose a mechanism from among these candidates and, possibly, to make further design choices, e.g., under cost-based pricing whether to use standard or actual and full or variable costs, and whether to add a profit markup; whether to make internal adjustments under market-based pricing; and whether to force internal sourcing ("exclusivity clauses") under negotiations.

At an early stage, division managers can often increase the gains from trade by investing in fixed assets. If these assets are relationship-specific (they cannot be redeployed easily), and contracts are incomplete (fully contingent contracts are infeasible), a "holdup" problem arises if prices are negotiated *ex post* (Williamson, 1985). The investing party anticipates that in the process of negotiation it will have to split

[1] These reasons include: to increase control over inputs, to capture upstream/downstream profits, to increase barriers to entry, and to facilitate investments in specific assets, e.g., Joskow (2005).

[2] For example, Horngren et al. (2007). For *multinational* enterprises (where taxation plays a crucial role), Ernst and Young (2008) report that market-based transfer pricing is most commonly used for tangible and intangible goods and for financing, whereas the cost-plus method is most frequently used to price services rendered internally. Note that negotiated transfer pricing is not admissible for tax reporting. In practice this categorization can be fuzzy at times. For instance, cost-based (market-based) transfer prices are often subject to markups (discounts), and determining those adjustments sometimes involves an element of negotiations.

the surplus with the other party, and therefore underinvests. Thus, HQ has to provide managers with appropriate *ex post* trading and *ex ante* investment incentives. To that end, it is useful to think of internal pricing schemes as mechanisms that determine: (i) the expected gains from trade for given investments and (ii) an allocation of bargaining power that determines the split of this surplus. It is these two factors combined that determine the divisions' upfront investment incentives.

In the absence of reliable and competitive market prices for intermediate goods, the most common internal pricing methods are negotiated and standard cost-based, as actual costs are often hard to verify for HQ. The main problem associated with standard cost pricing is that cost standards are often set (or influenced) by the upstream division, and thus inflated.[3] This in turn gives rise to a double-marginalization problem (Tirole, 1988). The main disadvantages of negotiations are haggling costs and the holdup problem. Using the above taxonomy, standard-cost pricing (with seller reporting discretion) confers more bargaining power to the selling division, yet the expected overall surplus is suboptimal. Ignoring haggling costs at first by assuming that the managers bargain under symmetric information, the double marginalization problem under standard-cost pricing is shown, in many cases, to be so severe as to make negotiations the preferred regime, despite the attendant holdup problem. Standard-cost pricing is particularly ill-suited if buyer investments are important, due to a holdup problem of its own: the seller will opportunistically submit an even higher "cost" quote upon observing that the buyer has invested in the transaction and thereby increased his willingness-to-pay. Thus, the buyer will be reluctant to invest under this pricing regime because the overall expected surplus will be smaller *and* he has basically no bargaining power.

Market-based transfer pricing is a viable mechanism if goods or services comparable to those transferred internally are traded in external markets. Firms often combine market-based pricing with *intracompany discounts*. This practice is usually rationalized with cost differences such as reduced transportation of bad debt costs. With imperfectly

[3] In Vaysman (1996) markups over cost arise endogenously as a result of informational rents earned by the upstream division.

competitive external markets, however, a more fundamental reason for internal discounts exists: to mitigate double-marginalization problems. Discounts are shown to be particularly effective (and under certain condition achieve first-best) if upstream capacity is constrained, whereas they can actually reduce firmwide profit with if capacity is abundant. Yet, even then, the performance of market-based pricing (with suitable internal discounts) converges to first-best as the importance of the external market relative to internal transfers becomes large.

Allowing for specific investments, it is shown that buyer investments under market-based pricing suffer from a holdup problem similar to that under standard cost-based pricing: the seller will raise the external market price (and thereby the transfer price) in response to the buyer investing. The holdup problem is alleviated, however, by the fact that the seller loses external business, as he is forced to raise the external price so as to capture some of the downstream rents. Even if imperfectly competitive, external markets thus provide some protection for investments for otherwise powerless internal buyers. Specific investments are shown to add further impetus for internal discounts; in particular they foster investments downstream.

The symmetric-but-nonverifiable information model has become the standard "work horse" in the incomplete contracting literature, mostly for reasons of analytic tractability, as generalized Nash bargaining results in full *ex post* efficiency (by the Coase Theorem). However, the assumption of symmetric information across divisions is unrealistic and, in the context of intrafirm transactions, conceptually problematic: if the divisions know each others' costs and revenues, why doesn't HQ? After all, it is HQ that designs the accounting system. Therefore, I will revisit the performance comparison of negotiated and standard cost-based transfer pricing in a model variant where each division has some private information at the bargaining stage. Negotiations (via sealed-bid bargaining) then also fail to realize all gains from trade *ex post*, i.e., this model variant picks up haggling costs.[4]

[4] This is in line with Williamson (2000) and Hart and Moore (2008) who stress the importance of *ex post* frictions for the optimal choice of governance mechanisms. Myerson and Satterthwaite (1983) employ a general mechanism-design approach to demonstrate that

Even with asymmetric information at the transaction stage, however, negotiations often generate greater firmwide *ex post* gains from trade than standard-cost pricing. Overall, the model provides the following prescriptions: HQ should choose the pricing mechanism that allocates more bargaining power to the party that: (i) has more private information (to minimize trade distortions) and (ii) more substantial investment opportunities (to minimize aggregate holdup problems), all else equal. A confounding factor to (i) and (ii), however, is that holdup problems tend to diminish with private information on the part of the investing party. To illustrate, suppose Manager X has some (or all) bargaining power but only Manager Y has an investment opportunity. If X is uncertain about Y's reservation price, then X will have to bid (or price) more "carefully" or otherwise risk foregoing the transaction altogether. Private information thus provides partial protection from holdup.

The sealed-bid mechanism for modeling bargaining under asymmetric information can be fruitfully employed also to study how compensation contracts affect divisional investment and trading incentives. Since it is rooted in non-cooperative game theory, one can trace explicitly how the managers' bargaining strategies are affected by the incentive contracts. Specifically, it is shown that HQ can alleviate trade and investment inefficiencies by adding non-financial performance measures (NPMs) to contracts that otherwise depend only on divisional profits. This is in line Bouwens and van Lent (2007) who have shown empirically that firms' use of NPMs is increasing in the extent of cross-divisional cooperation.

A key theme running through this paper is that HQ plays a rather limited role in mediating individual transactions. This captures the stylized empirical fact that in most divisionalized firms HQ designs the broad "rules of the game" by choosing a pricing mechanism and compensation contracts, but usually does not get involved in pricing on a product-by-product basis.

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bargaining under asymmetric information (given budget balancing) will always result in inefficiency.

In the following, I make no attempt at an exhaustive survey of the transfer pricing literature but focus on select articles that have studied commonly used pricing schemes using incomplete contracting models: Baldenius et al. (1999), Baldenius (2000), Sahay (2003), Baldenius and Reichelstein (2006), Baiman and Baldenius (2009), and Pfeiffer et al. (2009). Most importantly, this paper ignores studies concerned with optimal mechanism design, "strategic" transfer pricing in oligopoly, or taxation.[5] Moreover, a number of restrictive assumptions will be made. First, the transaction is one-shot.[6] Second, I ignore firmwide profit sharing and instead (for the most part) assume compensation is tied solely to divisional income, which appears descriptive; managers are risk neutral.[7] Lastly, upfront contracts cannot be written due to lack of *ex ante* describability of the product to be traded later. Again, this appears descriptive as formal upfront contracts between divisions are rarely observed.[8]

The remainder of this monograph is organized as follows. Section 2 develops the basic symmetric information model to compare the performance of cost-based and negotiated pricing in the absence of external input markets. Section 3 considers market-based pricing and the role of internal price adjustments; it ignores investments and focuses solely on

[5] For selective references for the omitted topics see Harris et al. (1982), Wagenhofer (1994), Vaysman (1996, 1998) on the mechanism-design approach to internal pricing; Alles and Datar (1998), Gox (2000), Narayanan and Smith (2000), Shor and Chen (2009) on strategic transfer pricing; and Halperin and Srinidhi (1991), Baldenius et al. (2004), Hyde and Choe (2005), Johnson (2006) on transfer pricing and taxes. See Gox and Schiller (2007) for a comprehensive survey.

[6] With infinitely repeated transactions and patient players, equilibria can be supported in which the holdup problem essentially disappears, by the folk theorem. Che and Sakovics (2004) show that even in a one-shot game, but with multiple rounds of "staged" investments, high investments can be sustained in equilibrium despite the fact that holdup problems remain. Dutta and Reichelstein (2009) study holdup problems in connection with investments in long-lived assets.

[7] Studying the tradeoff between risk premia and holdup, Holmstrom and Tirole (1991) and Anctil and Dutta (1999) derive optimal weights on divisional and firmwide performance measures.

[8] Rogerson (1992), Edlin and Reichelstein (1995), Wielenberg (2000), Bockem and Schiller (2004), among others, have shown that non-contingent upfront contracts, to be renegotiated once uncertainty is resolved, can resolve the holdup problem. See also Maskin and Tirole (1999).

trading incentives. Section 4 adds investments to the model of Section 3 and shows that investment opportunities further strengthen the case for internal adjustments. Section 5 reconsiders the initial analysis of Section 2 for the case of asymmetrically informed divisional managers. Section 6 concludes.

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