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**A REVIEW OF THE ECONOMICS AND ACCOUNTING  
LITERATURE ON INTERNAL TRANSFER PRICES**

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**INTERNAL MARKETS**

In response to increased pressure to innovate quickly and reduce costs, the business community has experienced an organizational transition from traditional centralized hierarchies to internal markets consisting of self-guided enterprises or profit centers. Magidson and Polcha (1992) characterize these internal markets as follows. Rather than providing budgets directly to internal selling centers, budgets are given to the operating units to purchase services or products either from internal or external suppliers. Internal suppliers have the freedom to sell their services or products to external customers as well as internal ones. Finally, high-level management retains the right to overrule any external transaction for strategic reasons.

There are many benefits associated with such a decentralized organization. Profit centers have increased flexibility to adapt to changing business environments. This operational freedom creates an innovative atmosphere that produces higher-quality services and products. The internal market also provides an increased awareness of costs and results in greater efficiencies. Finally, high-level management is able to focus on strategic decisions rather than the day-to-day operational details of the business. (See Halal, 1994.)

**ROLE OF TRANSFER PRICES**

Just as prices facilitate transactions in external markets, internal transfer prices enable profit centers to transact in internal markets. Eccles (1985) estimates that 80 percent of the *Fortune* 1,000 compa-

nies have internal transfer prices for goods. In an earlier survey, Vancil (1978) estimates that on average the amount of goods traded internally is equivalent to 10 percent of total sales or total cost of goods sold.

There is some disagreement between the economics and accounting literatures about which activities and outcomes internal transfer prices should be designed to influence. The economics literature proposes that transfer prices should be designed to lead autonomous profit centers to make decisions that maximize firm profits—that is, prices should lead centers to make decisions that the firm’s executive managers would if they had full information. (See Hirshleifer, 1956.) However, the accounting literature adds a second goal for transfer prices—they should aid, rather than impede, the performance evaluation process for profit centers and their managers. (See Benke and Edwards, 1980; Eccles, 1985 and 1991; and Kaplan and Atkinson, 1989.) To the extent that profit centers are evaluated according to their return on investment and profit, transfer prices should be designed so that they do not distort profits or costs across centers, giving false impressions of performances and contributions to the corporation. Such distortions could lead center managers to make suboptimal production or investment decisions. As is discussed below, the goals of profit maximization and aiding performance evaluation can work against each other.

The transfer pricing goals of promoting optimal resource decisions and supporting performance evaluation are short-run goals. Hirshleifer (p. 184) concludes his analysis with a cautionary note about using transfer prices for strategic decisions: “When non-marginal decisions like abandoning a subsidiary are under consideration, a calculation of the incremental revenues and costs of the operation as a whole to the firm should be undertaken.”<sup>1</sup>

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<sup>1</sup>Solomons (1965) recommends using linear programming to calculate shadow prices of those resources for which transfers are constrained by internal production capacity. Shadow prices, which indicate the change in total profits associated with a unit increase in production capacity, can facilitate long-run capacity decisions.

## THEORY OF OPTIMAL TRANSFER PRICES

There is a large body of research on optimal transfer prices that stems primarily from the microeconomics and accounting literatures. There are several comprehensive reviews of this work (see Eccles, 1985, and Eccles and White, 1988); therefore, we focus here on a few papers that represent the range of transfer pricing research across disciplines.

In his seminal article, Hirshleifer (1956) derives optimal transfer prices that lead autonomous profit centers to make decisions that maximize firm profits. Assuming that the operating costs of each center are independent of the level of operations in other centers (technological independence) and that additional external sales by a center do not reduce external demand for the other centers' products (demand independence), Hirshleifer demonstrates that the optimal transfer price is the marginal cost of producing the intermediate good or service. More generally, the center that produces the intermediate product should provide a schedule of marginal cost associated with different output levels so that the center that produces the end product can choose the optimal joint level of output. The only circumstance under which this optimal price equals the market price for the intermediate product is when the external market for the product is perfectly competitive. Marginal cost transfer prices provide the center that produces the end product with the information necessary to produce at the level that is optimal for the firm as a whole—the level that equates the marginal cost of production with marginal revenue.<sup>2</sup>

Benke and Edwards (1980) have similar views on constructing transfer prices. They examined the transfer pricing practices of 19 firms to find principles that other organizations could use to implement transfer pricing policies that are appropriate for their individual cir-

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<sup>2</sup>When the assumption of demand independence is relaxed, the optimal transfer price lies between the good's marginal cost and the market price. The case of technological dependence is too complex to solve, and Hirshleifer speculates that autonomy among centers may not be possible in this case.

Neither demand nor technological dependence appears to be relevant to depot-level repair for the Air Force. There is no external demand for depot-level repair, and the depots' cost functions should be largely independent of the level of wing operations.

cumstances. Their investigation led to a general rule: an internal transfer price should equal the product's standard variable cost plus the opportunity cost associated with outside sales that were lost due to internal sales. This opportunity cost is zero when there is excess production capacity or there is no reliable external price for the product. The authors specifically exclude fixed costs from transfer prices because including them in the internal price transforms them into variable costs to the purchasing center, thus distorting decisionmaking in that center. However, they suggest several ways to pay for these fixed costs without interfering with the evaluation of centers. One way is to leave them in the selling center but not include them in profit calculations. Another is to transfer them to the corporate level. A third option is to transfer them to the purchasing center through periodic charges that are unrelated to the volume of purchases.

Eccles interviewed 144 managers in 13 firms from the chemicals, electronics, heavy machinery, and machinery components industries to determine how transfer prices are implemented and managed in practice. Eccles (1985 and 1991) and Eccles and White (1988) discuss the three most common transfer pricing policies observed in the survey: mandated full-cost transfers, mandated market-based transfers, and exchange autonomy in which prices range between full cost and market.<sup>3</sup> In addition to observing diversity in policies across firms, the authors observed multiple policies even within firms corresponding to different product strategies and environments. This divergence between theory and practice—in particular, a lack of marginal cost pricing and frequent use of full-cost transfers—led to a new theory to explain transfer pricing practices.

Eccles (1985) and Eccles and White (1988) emphasize that a firm's transfer prices must be tailored to support the firm's strategy and policies. Further, prices must be flexible enough to adapt to changes

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<sup>3</sup>Eccles (1991) discusses a fourth transfer pricing policy that is used selectively for specific strategic purposes. The author observes that firms with low vertical integration and independent centers that are evaluated based on financial performance objectives sometimes use dual pricing to promote internal transfers in the presence of excess capacity in the selling center or a proprietary technology. The dual transfer pricing policy is characterized by the purchasing unit paying cost and the selling unit receiving market price for the transferred product. However, the firm must reconcile any double counting across centers.

in these. Eccles and White link the three popular transfer pricing practices to two strategic questions that any firm with an internal market must address. The first is whether the profit centers are part of a strategy of vertical integration; that is, are internal transfers mandated or are purchasing and selling centers allowed to make choices among potential internal and external exchange partners that maximize their individual outcomes. If the firm has a strategy of vertical integration, the second question is whether the firm is pursuing a strategy of vertical integration to lower the costs of intermediate products. If so, Eccles' survey indicates that the firm will implement full-cost transfer prices.<sup>4</sup> Otherwise, the firm will use market-based prices that facilitate comparisons of internal profit centers to external competitors. Eccles (1985) argues that transfer prices based on variable costs are rarely seen in practice because they hinder measurement and evaluation of profit center contributions to the company.

Eccles (1991) notes that a firm's performance evaluation policy must match its transfer pricing strategy for each to be effective. A selling center manager who is evaluated based on financial performance measures will not like transfer prices based on marginal or variable costs because the center does not earn any profit from internal sales to help offset its fixed costs. Thus, the center has low reported earnings, which leads to low morale. For centers that transact using mandated full-cost prices, evaluations should emphasize corporate performance and individual performance rather than the financial performance of centers. For centers that use mandated market-based prices, evaluations should be based on financial measures such as center profit and return on investment as well as more subjective criteria such as interdependent contributions.

Kaplan and Atkinson (1989) also acknowledge the tension between the transfer pricing goals of promoting economic decisions and enhancing performance evaluation and tie their recommendations for optimal transfer pricing policies to firm strategies and environments.

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<sup>4</sup>Two types of full-cost transfer prices are observed in practice. The first type is standard full cost, which is calculated as the expected unit cost of production for a specified period. The selling unit is responsible for any variation in its costs. The second type is actual full cost, which transfers responsibility for any variation in the selling center's costs to the purchasing center. See Eccles (1991) and Eccles and White (1988).

The authors' first three recommendations are quite similar to those discussed above. First, if a competitive market exists for the intermediate product, Kaplan and Atkinson recommend that the transfer price for the item should be set equal to the market price (less transaction costs that are avoided with internal transfers). At the other extreme, if no external market exists for the intermediate product, the transfer price that leads to the optimal level of internal transactions is the marginal cost of production. The authors also advocate that the purchasing center should pay a fixed fee to the selling center for the privilege of transacting with it at marginal cost. This fixed fee would cover the selling center's fixed costs. By assigning fixed costs in proportion to the percentage of capacity devoted to the internal purchaser, this two-part pricing scheme leads to efficient resource allocation while allowing the selling division to recover its costs and forcing the purchasing center to recognize the full cost of obtaining products from the selling center.<sup>5</sup> When an imperfectly competitive market exists for the intermediate product, Kaplan and Atkinson recommend that the managers of the purchasing and selling centers negotiate the price and terms of the transfer. This policy's success requires freedom to buy and sell externally, occasional transactions with external suppliers and buyers, and support from high-level management.

Kaplan and Atkinson's recommendations diverge from those of Eccles (1985 and 1991) and Eccles and White (1988) with respect to full-cost prices. While Kaplan and Atkinson note that such prices are often used in practice, they find no justification for them. The authors argue that full-cost prices distort economic decisionmaking by transforming the fixed costs of the selling center into variable costs for the purchasing center. These prices provide poor incentives for the selling center because they do not reward efficiency or penalize inefficiency. Full-cost prices also do not contribute to evaluating the performance of centers. And finally, inclusion of firm costs, such as G&A, that are allocated across centers may make the firm's end product less competitive (e.g., if the prices of intermediate products include a proportional markup for profit).

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<sup>5</sup>Solomons' (1965) recommendations are consistent with these of Kaplan and Atkinson.

### **ALLOCATING COSTS CORRECTLY**

Kovac and Troy (1991) discuss Bellcore's struggle to find full-cost transfer prices for support services that would encourage staff to use internal services and pay a fair price for them. Bellcore's original transfer pricing system assigned overhead costs such as G&A and non-usage-based services (e.g., records management, library services) to divisions based on headcount. As a result, the cost of labor-intensive support services such as graphics, technical publications, and secretaries were too high. This resulted in highly trained technical researchers performing these tasks for themselves or negotiating with outside vendors.

Bellcore formed a task force to look into the problems with its internal transfer prices. This group discovered that non-usage-based services and G&A services were a larger percentage of total costs for the labor-intensive support services divisions than for other divisions. Therefore, the task force set out to determine the appropriate drivers for these costs. Analysis indicated that for non-usage-based services, the appropriate driver is the percentage of technical and administrative personnel in the division. The task force also discovered that headcount drives a portion of G&A expenses (e.g., personnel, security), but that the percentage of the firm's direct and capital-related costs attributable to the division is closely related to the remainder of the expenses (e.g., legal, comptroller). Better cost allocation has led to a transfer pricing system that everyone perceives as fair and a better allocation of the technical staff's time.

### **USING CONFLICT**

Conflicts among parties can arise in any market situation, and parties to internal transactions are not immune to conflict just because they are part of the same organization. However, as Eccles and White (1988) and Halal (1994) note, conflict among profit centers does not necessarily prevent desired transactions, and it may even be encouraged by high-level management because of the information it generates.

Eccles and White note that when centers are required to transact with one another and when transfer prices are based on the full cost of the transfer (which includes fixed costs), conflict may arise from

the difficulty of allocating fixed costs. When prices are determined in advance of actual demands, the financial performance of selling centers is linked to the actual demands of buying centers. The conflict associated with the difficulty of separating financial performance of one center from another may lead center managers to monitor each other's centers, reducing the time high-level managers must spend monitoring center activities. Also, this conflict provides information to top management that would be difficult or costly to obtain otherwise, and trying to do so may provide center managers with the excuse of interference of top managers for not meeting their goals.

Halal reports that high-level management at MCI promotes conflict among its centers for slightly different reasons. When new ideas for products such as Friends & Family arise from MCI's independent business units, management tries to avoid diluting unit autonomy by imposing centralized decisions. Constructive debates among the business units over new ideas usually result in decisions that everyone can support.

### **TRANSITION TO INTERNAL MARKETS**

The transition to internal markets can be traumatic for organizations that have existed for years as centralized hierarchical entities. Magidson and Polcha (1992) and Halal (1994) characterize implementation plans that help minimize the short-run costs associated with the transition.

Magidson and Polcha relate the transition experience of John Charlton of Esso Petroleum Canada. Charlton suggests that prior to implementation, an organization should ensure the participation of everyone at all levels of the organization, formally introduce the concept of internal markets, and recognize that not all current employees will be happy and productive in the new environment. To continually promote implementation, he recommends that the organization create a shared vision for the new organization, invest in training for business skills necessary for the market environment, provide timely feedback on results, create a method to measure the contribution of all levels of the organization, recognize and reward

success, and develop an accounting system that can support internal transactions.<sup>6</sup>

Halal adds that it is useful to begin the transition within a small part of the organization, recruit enterprising employees to be involved in the pilot project, and make the reorganization effort the top priority.

### **TRANSFER PRICING IN THE DEPARTMENT OF DEFENSE**

Recently, many economists and accountants have become interested in the application of transfer pricing theory to the Department of Defense's implementation of stock funding.

Rogerson (1995) discusses three particularly problematic features of DLR pricing in the Air Force: (1) costs attributable to the supply system but not to repair are allocated to repair prices, (2) replacement costs are tied in to repair prices, and (3) the supply system charges the same for repairs of below-average difficulty as for more difficult ones for each type of DLR. His analysis suggests that the consequence of the first two of these features is that repair prices are too high, leading military units in many instances to avoid transacting with the supply system for DLR repairs when depot repair is actually the most economical source of repair in terms of total cost to the Air Force. Rogerson argues that the third feature induces military units to perform more of the easy repairs on base even when it is more economical for the Air Force for those repairs to be performed at the depot.

Rogerson recommends that those central logistics costs that do not vary with the rate of repair should be funded through annual charges to the major commands and/or to the Air Staff. Costs of replacing condemned items should be recovered through charges to military units based on the number of each type of DLR they use. He also recommends improving internal information systems to enable improved tracking of repair costs and, thereby, allow for repair charges based on difficulty of repair.

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<sup>6</sup>See Cooper (1989) for a discussion of how a poor cost accounting system can lead to transfer prices that are inconsistent with a firm's internal market strategy.

Trunkey and Choi (1996) discuss four reasons why they conclude that DBOF, and presumably now the working capital fund, has not yielded good decisionmaking. First, like Rogerson and others, they point out that prices do not reflect costs of providing services. Second, customers have little choice among service providers and sometimes must purchase from a sole supplier who has little incentive to produce efficiently. Third, those making decisions about location of repair are not always the ones who must pay the bills or who have the best information. An example of this problem is when location of repair is mandated rather than left to a unit's discretion. Finally, producers have little ability or incentive to reduce costs. For example, the central logistics function cannot, on its own, decide to close a depot and consolidate workload. And limited competition creates little incentive to reduce costs even if the ability were there.

Trunkey and Choi recommend solving these problems by eliminating price stabilization and excluding fixed costs and past-year losses from prices, instead recovering these funds through separate charges to customers. They also recommend increasing public/private competition and penalties for losses and rewards for gains to service suppliers. Finally, they recommend placing more decisionmaking authority in the hands of the unit purchasing the service.

Placing decisionmaking authority with the customer without correcting price distortions can result in worse outcomes. Camm and Shulman (1993) provide a case study of how a location of repair decision was influenced by Air Force DLR pricing. Faults attributed to avionics components often cannot be duplicated (CND) by test equipment. If the fault cannot be duplicated, the item is returned to stock and no further repair cost is incurred. However, the customer is charged the same price whether or not an item needs repair. Thus, the customer is overcharged for items not found to need repair. In spite of Air Force policy to repair all F-16 avionics at depot level, Air Combat Command (ACC) chose to maintain resources to screen for CNDs at F-16 bases rather than pay overcharges associated with DLR prices for these items. Camm and Shulman suggest that the inability of ACC wing commanders to trade off personnel and other resources also contributed to this decision. The authors' analysis shows that it is less costly to the Air Force to consolidate F-16 avionics component CND screening at the depot. Thus, the pricing strategy and con-

straints on decisionmaking contributed to an inconsistency between ACC's financial interests and those of the Air Force.

The General Accounting Office (GAO, 1994) also recommends that fund prices should reflect actual costs of providing goods and services. Recovering prior-year losses through increased current prices "distorts the Fund's actual results of operations in a given year, diminishes the incentive for the Fund to operate efficiently, and makes it difficult to evaluate and monitor the Fund's status."<sup>7</sup> The GAO recommends that prior-year losses be recovered through a separate appropriation.

The GAO points out that prices are based on data and assumptions from as early as two years before the prices go into effect, and, therefore, it would expect differences between estimated and actual outcomes. However, the GAO attributes the large differences between revenues and actual costs (as of 1994) to systemic problems, including unrealistic productivity assumptions. GAO also discusses the absence of reliable financial data and recommends that DoD "pursue short-term efforts to improve the quality of the information used to prepare the Fund's financial reports."<sup>8</sup>

Glass (1994), in a brief issue paper, considers the long-run consequences of current DLR pricing distortions. He suggests that a pricing system that induces customers to avoid transacting with the repair depots in peacetime may be problematic if the repair depots are to provide responsive wartime support. Glass lists four alternatives for fund pricing policy. First, as more repair migrates to the local level, allow prices to rise (because fixed costs must be covered by a smaller sales volume). This would ultimately put pressure on the depots to reduce their fixed costs but would yield uneconomic dependence on local repair. Second, constrain customers from making uneconomic choices.<sup>9</sup> This alternative removes the ability of the price system to provide information and choice to the customer and presumes that the central authority has better information than

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<sup>7</sup>GAO (1994), p. 7.

<sup>8</sup>Ibid., p. 16.

<sup>9</sup>In fact, the Air Force has attempted this by requiring that an alternative source of repair be less costly than the depot repair cost. See the discussion in Chapter Four.

the customer. Third, as others have recommended, eliminate the fixed costs from the calculation of prices and recover these costs in some other way. Fourth, allow customers complete freedom to choose their sources of repair. This alternative, given current pricing strategies, would almost surely yield a reduction in depot wartime capacity.

Melese (forthcoming) focuses on the behavior of the depot repair shops that transact with DBOF (now the working capital fund). He argues that, in the absence of competition, current pricing and pricing approaches recommended by others offer insufficient incentives for reducing cost of depot repair. He recommends that the surplus of revenues over costs resulting from cost reductions be shared with depot shops over multiyear periods to provide incentives “to foster efficiency and productivity improvements.” The multiyear approach is required to induce the depot to engage in cost-saving capital investments. The ability to attribute cost reductions to specific organizational changes or investments is a central requirement of this recommendation.