



Determining intra-company transfer pricing for multinational corporations



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ABSTRACT

Although significant attention has been paid to transfer pricing – the pricing of intermediate products sold between different divisions within one company – the focus has been limited to tax minimization within regulatory boundaries. This paper presents a comprehensive model that aims to determine the optimal transfer price for a multinational corporation (MNC) to maximize the entire organization's profit. The model considers the situation in which intermediate products are sold from the MNC's selling divisions to buying divisions; the buying divisions further process these intermediate products to produce final products; the final products are then sold in both selling-divisions and buying-divisions across the MNC's global locations. In contrast to the existing literature, our innovative model incorporates elements such as international transportation costs, holding costs, taxes, tariffs (including the introduction of a second tariff), and exchange rates. This paper also provides managerial insights about the impact of setting transfer prices in different currencies on the variance of each division's profit given exchange rate uncertainty.

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1. Introduction

Transfer pricing refers to the pricing of an intermediate product or service that is transferred between two divisions within a multinational Corporation (MNC). Because this transfer price has a direct impact on the revenue of the MNC's selling divisions and the costs of buying divisions, it is also usually seen as a tool for allocating an MNC's total profit. For this reason, transfer pricing can be misused for tax avoidance by companies that intentionally lower profits in divisions located in high-tax countries and increase profits in divisions located in low-tax or tax-haven countries (Wiederhold, 2013). This is particularly true in North America, where corporate taxes are usually higher than in countries like Ireland, Luxembourg, or Switzerland, for example.

More than 60% of world trade takes place within multinational corporations, the importance of transfer pricing becomes clear. Currently, more than 60 government tax authorities enforce transfer price rules. Most of them adopt “arm's length principles.” Article 9 of the Organization for Economic Co-operation and Development (OECD, 2003) Model Tax Convention defines arm's length principles as such:

“where conditions are made or imposed between the two enterprises in their commercial or financial relations which differ from those which would be made between independent enterprises, then any profits which would, but for those conditions, have accrued to one of the enterprises, but, by reason of those conditions, have not so accrued, may be included in the profits of that enterprise and taxed accordingly.”

To put this definition in less technical phases, the arm's length principle basically states that a transfer price should be the same as if the two companies involved were indeed two independents, not part of the same corporate structure.

In current taxation practices, several methods are used to determine transfer prices that are compliant with arm's length principles according to the OECD guideline. These include, from a transaction perspective, the comparable uncontrolled price, the cost-plus method and the resale price method; from a profitability perspective, these taxation practices include the comparable profits method, the transactional net margin method, and the profit split method. These methods are typically used to justify the fairness of the transfer price in order to mitigate the risk of later tax adjustments and potential fines.

By Ernst and Young (2007), more than 90% of the companies surveyed, indicated that transfer pricing is an important international taxation issue that they face, and 31% indicated that transfer pricing would be absolutely critical for them over the next few years. Presently, when companies try to determine transfer prices, their goal is to minimize taxes and avoid authorities raising red

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flags on them, but they often neglect to consider maximizing profitability by accounting for tariffs as well as production, transportation, and warehouse costs.

In May 2013, the U.S. Congress investigated a case at Apple Inc. that revealed an average tax loss of \$10 billion per year resulting from several tax avoidance schemes, including setting up divisions in lower-tax countries and manipulating the transfer prices of its digital products. This led to the re-attempt to close loopholes in tax law and regulations known as “check the box” and “look through” that let some offshore units be disregarded for tax purposes, sheltering substantial profits from taxation. Although the re-attempt turned out to be unsuccessful, it raised attention on transfer pricing from the public and government authorities. Other countries are toughening their stance on tax avoidance as well. During the 2013 G-20 meeting in Russia, 20 countries committed to sharing taxation information by the end of 2015. In addition, the U.K. and China announced policies to further scrutinize offshore profit shifting in September and December 2014, respectively.

The message is clear: a new transfer pricing strategy is needed, and tax minimization will no longer be the focus. This need for change motivated us to develop a model that returns the optimal transfer prices with the goal of maximizing an MNC's overall profits rather than simply minimizing its taxes. Our model will allow companies to pay their fair share of taxes while maintaining a healthy gross margin.

Although not fully recognized and implemented by MNCs, profit maximization models have been explored in scholarly literature dating back to 1956. In comparison to models and proposals discussed in the existing body of literature, our model introduces more practical cost elements to better reflect actual business operations. These cost elements include the “second tariff,” which, to the authors' knowledge, has not been previously examined in profit maximization stream of literature. The model is significant also because it incorporates all the practical cost elements including manufacturing costs, international transportation costs, holding costs, taxes, tariffs and exchange rates, whether or not they have been mentioned in literature. Furthermore, the solution approach of our model is simplified to meet the limitations of the computing capability and software capital investment of actual businesses. Specifically, with this new model of determining transfer pricing, we aim to answer the following research questions:

- How does a MNC determine optimal transfer pricing when considering practical cost elements such as operations costs, taxes, tariffs, and second tariffs?
- How does the selection of the transfer pricing currency affect the risk of each division? What managerial insights does the model offer to division managers on currency selection?
- Does this model's optimal solution echo that of existing models? If so, how?
- How does optimal transfer pricing change with varying economic parameters and cost elements?

Our general model shows that the consideration of realistic cost elements impacts the optimal solution to a fair extent, compared with existing models such as [Kassicieh's \(1981\)](#). A sensitivity analysis of this model's parameters suggests that MNC division managers need to closely monitor the tax-rate fluctuations of the selling/buying countries, and adjust the transfer price accordingly. To our surprise, our model suggests that setting the transfer price in the selling division's currency will benefit not only the selling division but also the buying division if all final products are sold back to the selling-division country. If all final products are sold in the buying division country, however, division managers have incentive to select their own local currency.

Next is a review of the closely related literature.

[Hirshleifer \(1956\)](#) studied optimal transfer pricing and output level aimed at overall profit maximization using the marginal price determination theory with consideration of net marginal revenue. He discovered that the market price is the correct transfer price only when the commodity being transferred is produced in a competitive market, that is, no single producer considers itself large enough to influence price by its own output decision; additionally, if the market is imperfectly competitive, or where no market for the transferred commodity exists, the correct procedure is to transfer the commodity at marginal cost or at some price between marginal cost and market price in the most general case. His research set the foundation for future research on transfer price setting based on profit-maximizing strategy and drew significant academic attention to this topic. Taxes were not considered in [Hirshleifer's](#) and subsequent marginal price determination theories, however.

Fifteen years later, [Horst \(1971\)](#) explored a profit-maximizing strategy for a monopolistic firm selling to two national markets. His model considered variable production costs, taxes, and tariffs, but transportation and holding costs were not considered. In addition, no solution approach is considered.

In the 1980s and 90s, this research stream expanded to studies with behavioral and managerial perspectives. [Eccles \(1985\)](#) concluded that when determining transfer prices, the objective should be to find prices that achieve global corporate goals and ensure that performance measures are fair for all of the firm's subsidiaries. [O'Connor \(1997\)](#) asserted that the reason for having different transfer prices stems from the conflict between the global corporation's general goals and its subsidiaries' specialized, internal goals. [Vaysman \(1998\)](#) demonstrates that the firm can design managerial compensation schemes and bargaining infrastructures so that the negotiated transfer pricing structure enables it to reach the upper bound on reasonably obtainable profits.

The topic of transfer pricing started to grow in popularity in the operations research academic community in the late 1990s when transfer pricing became an integral mechanism of global supply chain optimization. [Vaysman \(1996\)](#) presented a model that maximizes expected firm-wide profits from a utility perspective. He discovered that when division managers were not able to communicate their private information to the firm's top management, a managerial compensation system employing cost-based transfer pricing allowed the firm to earn strictly higher expected profits than if the firm's top management made all decisions based on division managers' reports. His model does not consider taxation and tariffs, however. [Fandel and Stammen \(2004\)](#), [Lakhal \(2006\)](#), [Vila et al. \(2006\)](#), and [Perron et al. \(2010\)](#) discussed the issue of transfer pricing in their global supply chain models; however, in each of these papers at least one cost element is overlooked; in contrast our model incorporates all cost elements – manufacturing costs, international transportation costs, holding costs, taxes, tariffs and exchange rates. In addition, solving these models requires significant computing power, which most companies do not possess.

Around the same time, researchers began to closely examine the methods used in everyday accounting practices. [Harris and Sansing \(1998\)](#) considered the comparable uncontrolled pricing method and showed that it tends to allocate a disproportionately high level of income to the firm's manufacturing division. [Baldenius and Reichelstein \(2006\)](#) investigated the market-based pricing method and the corresponding discounts of internal price where the selling divisions have both external and internal markets. They found that internal discounts are not sufficient to improve overall corporate profits, and that fully efficient outcomes of discounts can only be attained when production capacity is constrained or the external market is substantially larger than the

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