

# Markup Rules and the Incidence of a Value-Added Tax at Different Stages of the Production and Distribution Process

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## Abstract

*The burden of a value-added tax is distributed each time the ownership of merchandise changes as the merchandise moves down-stream through distribution channels to consumers. Other things being equal, the burden of the tax on retailers or other vendors purchasing merchandise for resale is determined by the markup rule chose by retailers or other vendors. Given the markup rules discussed, a fixed-percentage markup is shown to minimize the value-added tax burden on firms purchasing merchandise for resale.*

## Introduction

On first thought a markup rule used by a retailer or other seller to set the selling price of merchandise purchased from wholesalers or other suppliers seems to be nothing more than a convenient method for setting a price which covers labor costs, overhead, and a margin of profit. But a markup rule takes on added importance when value-added taxes are considered because, other things being equal, a seller's choice of a markup rule determines the elasticity of that seller's demand for merchandise from suppliers and the elasticity of a seller's demand will determine the incidence of the value-added tax levied on suppliers.

The relationship between markup rules and the incidence of value-added taxes has received little attention from tax analysts but could be of considerable practical significance to business here in the United States if value-added taxes were to become an important source of government revenue. Consequently, it is the purpose of this paper to explain how markup rules affect the elasticity of demand for products as they move downstream through channels of distribution toward retail markets and, as a result, how the selection of a markup rule by sellers can minimize their share of the burden of value-added taxes levied on suppliers upstream. To pursue this goal, four topics will be discussed: the relationship between tax incidence and the elasticity of demand; types of markup rules; the relationship between markup rules and the elasticity of demand; and the relationship between markup rules and the incidence of a value added tax.

## Tax Incidence and the Elasticity of Demand

Almost every textbook on microeconomics explains how the burden of a sales tax levied on the seller of a product may be shifted from the seller to the buyer to the extent allowed by the elasticities of supply and demand. Accordingly valued-added tax analysts like Brashares et al. (1988), Lindholm (1976), and Price and Porcano (1992) recognize that much of the burden of a value-added tax, which is essentially a sales tax, will be borne by consumers. But a value-added tax is a multi-level sales tax collected each time products or components change ownership as they move downstream toward consumers along channels of production and distribution. Thus, as noted by Lindholm (1976, p. 74) the burden of a value-added tax will be distributed each time products are transferred from one level of distribution to the next.

Ignoring for the purposes of this analysis the elasticity of supply, the distribution of the burden between sellers and buyers at each stage of the distribution process will be determined by the elasticity of demand, the less elastic the demand, the greater the share of the tax the seller can shift to the buyer. At the retail stage of the distribution process, demand and its elasticity are determined by the interaction of retailers and consumers. Upstream from retail markets, demand and its elasticity are derived from demand at retail.

Consequently, upstream from the consumer, the incidence of a value-added tax at each stage in the distribution process will be determined by the elasticity

of derived demand at each stage. Thus the question arises, "How does the elasticity of demand for a product change as it moves downstream toward the consumer?" Assuming the product sold at each stage of the distribution process is identical, that is, assuming the form of the product does not change, it can be demonstrated that its elasticity of demand will either remain the same or increase as the product moves downstream toward the consumer. If elasticity remains the same at all stages, suppliers at all stages would be able to shift the same share of the tax burden forward to buyers at the next stage downstream. If elasticity increases, then upstream suppliers would be able to shift greater shares of the tax burden forward to buyers than those buyers would be able to shift downstream when they resell the product. For example, if demand is more elastic at retail than at wholesale, wholesalers would be able to shift a greater share of the tax forward to retailers than retailers would be able to shift forward to consumers -- a situation retailers would like to avoid. But retailers and other downstream suppliers may be able to avoid this situation because they determine the rule they use to markup their merchandise cost to their selling price, and it is the markup rule which determines the elasticity of their demand for merchandise from upstream.

### Types of Markup Rules

Scherer and Ross (1990, pp. 261-265) suggest that markup rules are rules of thumb based on average cost used by business to cope with the complexities of estimating demand elasticities when making pricing decisions by largely ignoring those elasticities. Thus, markup rules have been employed because they constitute a pragmatic approach to pricing policy, especially for firms selling thousands of products. But they have also been accepted because of the belief that all products should bear their fair share of overhead and contribute to a fair profit for the enterprise. Their use as guidelines for pricing decisions has been documented in both manufacturing and retailing by a number of analysts including Silberson (1970) and Cyert and March (1963, pp. 146-147). Three types of markup rules have been identified by Tomek and Robinson (1981, pp. 59-62); namely, the fixed-dollar markup, the fixed-percentage markup, and a markup that is a linear combination of the first two.

The fixed-dollar markup, Tomek and Robinson report, is commonly used in distribution channels for agricultural products. Lewison and Delozier (1989, pp. 568-569) report that fixed-dollar markups are also used in retailing on big-ticket items, like jewelry. But Clower et al. (1988, pp. 304-308) note that the fixed-percentage markup is generally used in retailing.

Fixed-percentage markups may be expressed as a percentage of cost or as a percentage of retail price after

markup. Operating and advertising costs are important determinants of the mark-up percentage. *Advertising Age* (1991) attributes Walmart's low prices and, presumably, its low markups, to the fact that its operating costs per sales dollar are significantly less than Sears' or K-Mart's and that its advertising costs rank low in the industry. Berman and Evans (1986, p. 444), however, note that retail markup percentages are influenced by a number of variables in addition operating and promotional expenses. These include traditional markups, manufacturer's suggested retail prices, product turnover, service requirements, competition, and profit goals.

Fixed-dollar and fixed-percentage markups are really special cases of a third type of markup rule. A markup may be a linear combination,  $M$ , where  $M = C + A * P_w$ ,  $C \geq 0$  is a fixed-dollar amount, and  $A \geq 0$  is a fixed percentage of merchandise cost or wholesale price paid,  $P_w$ . Thus the selling or retail price,  $P_r$ , becomes  $P_r = P_w + C + A * P_w = P_w * (1+A) + C$ .

### Markup Rule and Elasticity of Demand

Analysis of this third rule reveals that the price elasticity of demand in retail markets is greater than or equal to the price elasticity of demand in wholesale markets. Or, more generally, it can be shown that, whenever the product sold in both markets is identical and the markup rule can be represented as a linear combination of fixed and percentage markups, the elasticity of demand in downstream markets is greater than or equal to the elasticity of demand in upstream markets. The proof of this relationship between elasticities at different market levels will now be outlined using wholesale and retail markets as examples of upstream and downstream markets.

The elasticity of demand at retail,  $E_r$ , can be expressed as

$$E_r = \Delta Q / (P_r - P_r) * P_r / Q \quad [1]$$

Because  $P_r = P_w * (1+A) + C$ , equation [1] can be expanded to

$$E_r = \Delta Q / ((P_w * (1+A) + C) - (P_w * (1+A) + C)) * (P_w * (1+A) + C) / Q \quad [2]$$

Collecting like terms and factoring reduces [2] to the following

$$E_r = \Delta Q / (P_w - P_w) * 1 / (1+A) * (P_w * (1+A) + C) / Q \quad [3]$$

By rearranging the expression for the elasticity of demand at wholesale,  $E_w = \Delta Q / (P_w - P_w) * P_w / Q$ , so that  $\Delta Q / (P_w - P_w) = E_w * Q / P_w$  then substituting in [3] and canceling  $Q$ , equation [4] results specifying the relationship between  $E_r$ , the elasticity of demand at retail, and  $E_w$ , the elasticity of demand at wholesale:

$$E_r = E_w \{1/(P_w^*(1+A)) * (P_w^*(1+A) + C)\} \quad [4]$$

$$= E_w \{(P_w^*(1+A))/(P_w^*(1+A) + C/(P_w^*(1+A)))\} \quad [5]$$

Equation [5] can be used to demonstrate the effect of the markup rule used by retailers on the elasticity of demand con-fronting wholesalers. The effect of each markup rule will be discussed separately. The fixed-dollar markup will be discussed first.

If a fixed-dollar markup is used, then  $A = 0$ ,  $C = P_r - P_w$ , and  $E_r = E_w \{P_r/P_w\}$ ; so  $E_r > E_w$  because  $P_r > P_w$ .

If a fixed-percentage markup is used, then  $C = 0$  and  $E_r = E_w \{(P_w^*(1+A))/(P_w^*(1+A))\}$ ; so  $E_r = E_w$ .

If the markup is a linear combination of fixed and percent-age markups, then  $C = P_r - P_w^*(1+A)$  and  $E_r = E_w \{P_r/(P_w^*(1+A))\}$ ; so  $E_r > E_w$  because  $P_r > P_w^*(1+A)$ .

### Markup Rule and the Incidence of a Value-added Tax

The analysis above demonstrates that when a seller chooses to use a fixed-dollar markup or a markup that combines a fixed-dollar markup with a percentage markup, the elasticity of demand in the market in which the seller resells a product will be greater than the elasticity of demand in the market in which the seller buys the product. This relationship between elasticities is less than optimal for the firm reselling a product subject to a value-added tax. It is less than optimal because the firm reselling the product will be forced to absorb a greater share of the tax levied on its suppliers than it can pass forward to its buyers.

But the analysis also shows that a fixed-percentage markup equates elasticities in markets along distribution channels. Equal elasticities, the only other relationship between elasticities possible with the markup rules discussed here, are more desirable for the firm reselling a product purchased from suppliers subject to value-added taxes. A fixed-percentage markup is more desirable than a fixed-dollar or combination markup because the firm reselling the product will be able to shift to its customers the same share of the tax it absorbed from suppliers. In other words, a fixed-percentage markup is more desirable than the other markup rules discussed here because it allows firms reselling merchandise purchased from suppliers subject to value-added taxes to pass on a greater share of the tax burden than those other markup rules. Consequently, if value-added taxes are imposed, firms may wish to consider the effect of the markup rule they have traditionally used on the elasticity of their demand for inputs and weigh the benefits of that rule against the burden of the value-added tax and other costs associated with using it. If costs outweigh benefits, firms not using a fixed percent-

age markup rule but marking-up merchandise for resale by one of the other methods described here may wish to change their method of setting selling prices.

### Summary and Conclusions

A markup rule is a convenient means for marking-up merchandise for resale. But, if value-added taxes are imposed, a seller's choice of markup rule will affect the incidence of those taxes on his or her business. Choice of markup rule affects tax incidence through the rule's effect on the elasticity of a seller's demand for goods purchased from suppliers upstream along distribution channels.

Given three different markup rules, fixed-dollar, fixed-percentage, and combined fixed-dollar and fixed-percentage, it was shown that the elasticity of demand will either remain the same or increase as products move downstream through distribution channels toward consumers. When the incidence of a value-added tax is considered, the fixed-percentage markup was found to be more desirable than the other rules for firms reselling merchandise because it equalizes elasticities between markets along distribution channels and equal elasticities allow firms to pass along the same share of the tax burden when they sell the product as was passed along to them when they bought the product; whereas the other markup rules restrict the ability of firms to shift tax burdens downstream.

### Suggestions for Future Research

Reflection on the conclusions of this paper indicates two areas for further research. First, the incidence of value-added taxes on sellers of merchandise marked up for resale depends upon the interaction of the elasticity of demand and the elasticity supply, which has been ignored in the preceding analysis. Thus sellers must take both demand and supply into account when evaluating the use of markup rules in the context of value-added taxes. Given the complexity of evaluating markup rules, a priori, under various supply and demand relationships, an empirical investigation of the types of markup rules in use in countries with well developed value-added tax systems might be conducted. This investigation might employ the survivor principle used by Stigler (1958) to identify efficient plant size. That is, the type of markup rule employed by an increasing proportion of firms in an industry over time would be deemed the most beneficial for firms in that industry. Second, markup rules have been chosen as decision-making tools by business for pricing products for resale to buyers. That is, markup rules have been selected with a view to their impact on buyers downstream. Yet this paper shows that markup rules can impact relationships with suppliers upstream, perhaps in unexpected ways. Thus it may be worthwhile to examine markup

rules for other effects upstream along channels of distribution.

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