1 Introduction

Pass-through is an important issue in many antitrust cases. For example, consider a cartel of manufacturers of an input. The cartel raises the price of the input and so raises manufacturers’ costs. The ultimate effect of the cartel on the end purchasers of the finished product depends on the pass-through of the overcharge through the supply chain.3 Consider also a proposed merger. The merger creates potential efficiencies. The ultimate effect of the merger depends in part on the pass-through of the efficiencies to consumers.4

Pass-through is conceptually straightforward in some circumstances. It is the effect of manufacturing cost or acquisition cost on the sale price of a product. In such circumstances, it is well understood that pass-through depends on the competition in a given market and the characteristics of the demand for the product.5

While this framework may be appropriate in circumstances in which an intermediary buys and then sells a product, it is not necessarily appropriate when the intermediary purchases a product and then sells it along with a complementary good or service. Examples include wireless carriers that purchase and sell handsets with airtime minutes, and distributors that purchase computers and sell them with IT support. In these circumstances, sellers choose the prices of products simultaneously, and the profit-maximizing price of one product may depend on the price of the other product.

This article examines the pricing behavior of firms as it relates to whether or not to pass through a change in the cost of one product when that product is sold together with a second product. In such circumstances, firms are likely to rely on what is known as a two-part tariff. As explained below, a

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2 I thank Evan Schouten and David Toniatti for excellent feedback. All errors, however, are mine.
4 See, for example, Joseph Farrell and Carl Shapiro, “Antitrust Evaluation of Horizontal Mergers: An Alternative to Market Definition,” The B.E. Journal of Theoretical Economics, 10(1), Article 9.
cost increase may or may not be passed through to the final consumer. Indeed, depending on the 
characteristics of the final consumers’ demand, a cost increase could result in no increase in the price 
of either product, an increase in the price of both products, or an increase in the price of one 
product and a decrease in the price of the other product.

In the remainder of this article, I describe the economic framework that should be applied to 
determine the conditions under which changes in costs will be passed through to the ultimate 
consumers. Importantly, the framework applies equally whether the reason for the change in costs is 
due to a cartel, a merger, or an increase in the market price of an input sold in a competitive 
marketplace.

2 Pass-Through with Two-Part Tariffs

A two-part tariff is a pricing strategy in which customers are charged a fixed fee that is independent 
of the quantity purchased and a variable fee that is proportional to the quantity purchased.6 Firms 
use two-part tariffs to maximize profits. Consumers may or may not benefit from their use.

A classic example is an amusement park in which a customer pays an admission fee and then pays a 
certain amount per ride.7 More commonly, many wireless telephone services are sold using a two-
part tariff. The customer purchases a mobile telephone for a fixed fee and then pays a variable fee 
for airtime minutes. Another example is a “value-add” distributor that sells computer equipment 
upfront at a fixed fee and IT services on an ongoing basis at a variable fee.

2.1 Two-Part Tariff with Homogenous Consumers

In thinking about the impact of cost changes on the actual prices charged by a firm that uses a two-
part tariff (or two-part pricing), it is helpful to start with the simple case in which all customers have 
identical demand curves (see Figure 1).

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6 The discussion that follows draws heavily from Robert Pindyck and Daniel Rubinfeld, Microeconomics, pp. 414–418; 
Douglas Bernheim and Michael Whinston, Microeconomics, pp. 683–694; Jean Tirole, The Theory of Industrial Organization, 
pp. 145–149; and Luis Cabral, Introduction to Industrial Organization, pp. 172–175.

7 This is sometimes referred to as the Disneyland Dilemma, a phrase coined in a class article by Walter Oi, “A 
96.
A profit-maximizing firm will charge a fee equal to the marginal cost for the good or service that is purchased repeatedly. Thus, for example, in the case of the value-add distributor that sells computer equipment and IT services, it will charge a price for IT services that is equal to its marginal cost ($P_{IT\text{ Services}} = MC_{IT\text{ Services}}$). At the same time, the value-add distributor will set the price of the computer (e.g., the fixed fee) equal to the entire consumer surplus (ABC in Figure 1). In this way, the firm is able to extract the entire area under the demand curve.

This pricing strategy has implications for the extent to which the seller will pass through a change in its cost of supplying the fixed-component product (e.g., computer equipment). Because an increase in the seller’s acquisition cost of the fixed-component product does not affect its marginal cost of supplying the variable-component product, the seller will not change its pricing of the variable-component product. And because the price the seller charges for the fixed-component product was already equal to the full amount of the consumer surplus, the seller will not change the price of the fixed-component product either. Thus, in this case, the seller does not pass through an increase in its cost of supplying the fixed-component product.

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8 Consumer surplus is the total benefit from the consumption of a product less the cost of purchasing it.
9 The increase in the cost of supplying the fixed-component product is not irrelevant to the seller. The cost increase reduces the seller’s profit. If the cost increase is large enough, the seller may decide not to offer the product(s) at all. But conditional on continuing to offer the fixed- and variable-component products, the increase in the cost of supplying the fixed-component product will not be passed through.
2.2 Two-Part Tariff with Heterogeneous Consumers

It is rarely, if ever, the case that all consumers are identical. More often, consumers are heterogeneous in their demand for goods and services. To see how this affects sellers’ pricing strategies, consider the case of two distinct types of consumers: “high demand” and “low demand.” If the seller prices the variable-component product at marginal cost, it then must set the price of the fixed-component product equal to the surplus of the low-demand consumer; otherwise, the low-demand consumer will not purchase the product. In this case, the seller may do better by pricing the variable-component product above marginal cost and setting the price of the fixed-component product equal to the remaining consumer surplus of the low-demand consumer. As Figure 2 shows, by pricing the variable-component product above marginal cost and the fixed-component product equal to the remaining consumer surplus of the low-demand consumer, the seller extracts all of the consumer surplus of the low-demand consumer and some of the consumer surplus from the high-demand consumer.\(^{10}\)

![Figure 2: Graph showing the pricing strategy for two-part tariff with heterogeneous consumers](image)

In the more general case where the seller faces more than two types of consumers, the seller’s challenge is to find the optimal pair of prices for the fixed- and variable-component products. In doing so, the seller faces tradeoffs. On the one hand, if it charges a higher price for the fixed-component product, fewer consumers purchase the fixed-component product. On the other hand, a higher price for the fixed-component product means a higher profit margin on the fixed-component product.

\(^{10}\) The profit is \(2F^* + (P^* - MC) / (Q_h + Q_l)\). This is larger than \(2*ABC\), which is the profit from pricing the variable-component product at marginal cost and the fixed-component product equal to the consumer surplus of the low-demand consumer.
product. Furthermore, the optimal price of the variable component may change as the price of the fixed-component product changes. When the price of the fixed-component product goes up, consumers who are not willing to pay a high price for the fixed-component product stop purchasing it, which leaves the consumers who are willing to pay a high price for the fixed-component product. The consumers who are willing to pay a high price for the fixed-component product, in turn, may have different demands for the variable-component product than the consumers who are not willing to pay a high price for the fixed-component product. If the consumers who are willing to pay a high price for the fixed-component product have less elastic demand for the variable-component product (i.e., are less sensitive to changes in the prices), the seller may increase the price of the variable-component product when it increases the price of the fixed-component product. Alternatively, if the consumers who are willing to pay a high price for the fixed-component product have more elastic demand for the variable-component product, the seller may reduce the price of the variable-component product when it increases the price of the fixed-component product.

This economic reasoning can be used to consider the pass-through of an increase in the cost of supplying the fixed-component product. When the cost of the fixed component goes up, the seller must re-optimize. In contrast with the case of homogenous consumers, here, the seller must assess whether its best strategy is to change only the price of the fixed component, change only the price of the variable component, or change both prices. Indeed, depending on the specifics of the demand curves of the various consumers, it is possible that an increase in the cost of the fixed-component product could lead to a decrease in the price of the variable-component product. Although counterintuitive, it is possible that some consumers actually benefit – that is, the new pricing structure may allow them to reduce the total amount that they pay.

It follows that to fully measure the seller’s pass-through of an increase in the cost of the fixed-component product, it is necessary to analyze how the prices of the fixed- and variable-component products change. Ignoring the possibility that an increase in the cost of the fixed-component product could cause the price of the variable-component product to change could result in an overestimate or underestimate of total pass-through.

2.3 Menu of Two-Part Tariffs with Heterogeneous Consumers

In some circumstances sellers may offer menus of options characterized by different pairs of prices. When a seller offers a menu of two-part tariffs, the profit-maximizing menu will include options
designed specifically for high- and low-demand consumers that satisfy two conditions: (1) high-demand consumers prefer the option designed for them and (2) low-demand consumers get zero surplus. In the option designed for the high-demand consumers, the price of the fixed-component product will be relatively high and the price of the variable-component product will be equal to marginal cost. And in the option designed for the low-demand consumers, the price of the fixed-component product will be relatively low and the price of the variable component product will be above marginal cost.

To analyze the pass-through of an increase in the cost of supplying the fixed-component product when a seller offers a menu of two-part tariffs, there are two cases to consider: (1) the seller continues to offer a menu of options and sells to both the high- and low-demand consumers and (2) the seller offers only one option designed for the low- or the high-demand consumer.

Consider first the case in which the seller continues to offer a menu of options and sells to both the high- and low-demand consumers. Suppose that prior to the cost increase, the seller offers a menu \((F_{hi}, V_{hi})\) and \((F_{li}, V_{li})\) where the price of the variable component in the option designed for the high-demand consumer \((V_{hi})\) is equal to marginal cost, high-demand consumers prefer the option designed for them, and low-demand consumers get zero surplus. If the seller were to respond to an increase in the cost of supplying the fixed-component product by increasing \(F_{hi}\) (the price of the fixed component to the high-demand consumer), some high-demand consumers would likely switch to purchasing the option designed for low-demand consumers. To avoid this, the seller would want to make the option designed for the low demand consumer less attractive by increasing \(F_{li}\) (the price of the fixed component to the low-demand consumer), but would have to be careful to price this option in such a way that the low-demand consumer still found it just attractive enough to purchase. However, any such change in prices would result in a combination of fixed- and variable-component prices that the seller could have chosen prior to the increase in the cost of supplying the fixed-component product. If this combination were profit maximizing now, it would have been profit maximizing prior to the increase in the cost of supplying the fixed-cost component. But we know that it was not profit maximizing prior to the cost increase because the seller already chose a different combination, so we know that it is not profit maximizing after the cost increase. Intuitively, if the seller continues to offer a menu of options and sells to both high- and low-demand consumers, the number of fixed-component units sold does not change, and so the increase in the cost of supplying the fixed-component product does not affect the profit-maximizing combination.
of fixed- and variable-component prices. Thus, the result is that in the case where the seller continues to offer a menu of options and sells to both the high- and low-demand consumers, the seller will not pass through an increase in the cost of supplying the fixed-component product.11

In some circumstances, rather than continue to offer a menu of options after a cost increase, it may be more profitable for the seller to respond to a cost increase by offering only an option that is specifically designed for the low- or high-demand consumer. To see why, consider the seller’s pricing to the high-demand consumer when it offers separate options for the high- and low-demand consumers. It sets the variable-component price equal to marginal cost and then sets a fixed-component price so that the high-demand consumer prefers the option designed for it to the option designed for the low-demand consumer. Thus, the option designed for the low-demand consumer constrains the pricing of the option designed for the high-demand consumer. Alternatively, if the seller decides not to offer an option for the low-demand consumer, it foregoes the profits it would have earned from selling to the low-demand consumer but can earn larger profits from selling to the high-demand consumer.

The possibility that the seller responds to an increase in the cost of supplying the fixed-component product by changing the mix of customers that it targets has implications for pass-through. If the seller decides to sell to high-demand consumers only, it can keep the price of the variable-component product at marginal cost and increase the price of the fixed-component product to extract the high-demand consumer’s surplus. Thus, at least some of the increase in the cost of supplying the fixed-component product is passed through to the price of the fixed-component product. The extent of the pass-through depends on how much the pricing of the fixed-component product to the high-demand consumer was constrained by the availability of the option designed for the low-demand consumer prior to the cost increase.

Finally, the possibility that a seller will respond to a cost increase by changing the mix of customers that it targets has implications for the dynamics of pass-through. A seller that offers a menu of options might not pass through an increase in the cost of supplying the fixed-component product if it continues to offer a menu of options. The seller might absorb the cost increase because it is still more profitable to sell to high-demand and low-demand consumers than it is to sell to high-demand consumers only. But eventually, if the cost increases add up, it may no longer be more profitable to

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11 The increase in the cost of supplying the fixed-component product does not change the profit-maximizing offers \((F_{1h}, V_{1h})\) and \((F_{1l}, V_{1l})\) and so is not passed through.
sell to both types of consumers, in which case the seller may decide to sell to high-demand consumers only. When the seller makes this change in strategy, it can raise the price of the fixed-component product. Thereafter, however, the seller will be back to the no pass-through scenario described in Section 2.1 – setting a variable-component price equal to marginal cost and a fixed-component price to extract the surplus of the high-demand consumer.

Thus, increases in the cost of supplying the fixed-component product may not be passed through when the seller offers a menu of options. If the seller eventually decides to sell only to high-demand consumers in response to cost increases, the seller may increase the price of the fixed-component product, passing through at least some of that cost increase. However, subsequent increases in the cost of supplying the fixed-component product may not be passed through.

3 Conclusion

In some circumstances, an intermediary purchases a product and then sells the product along with a complementary good or service. Examples include wireless carriers who purchase and sell handsets with airtime minutes, and distributors who purchase computers and sell them with IT services. In these circumstances, pass-through may be less straightforward than in the case of an intermediary that purchases and sells a single product, or purchases and sells multiple products but sets the prices of the products separately. Sellers who purchase products and then sell those products along with a complementary good or service choose prices simultaneously; the optimal price of one product depends on the price of the other product, and vice versa. In some cases, an increase in the price of the fixed-component product may not be passed through at all; in other cases, it may be passed through by increasing the prices of both the fixed- and variable-component products; in still other cases, it may result in an increase in the price of the fixed-component product and a decrease in the price of the variable-component product. Economists have developed frameworks for thinking about pricing and pass-through in circumstances in which an intermediary purchases and sells a product along with a complementary good or service, and these frameworks can and should be applied where relevant.