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AUGUST 2002

## Elastic profits

### MANAGING THE RISKS OF A PRICE CHANGE

*When setting prices, most firms focus on the question of how sales will react. This relationship, known to economists as "the price elasticity of demand", is important – but only part of the profit equation. Costs, although obviously a key factor, are too often neglected in pricing decisions. By building the links between sales volumes and costs into the analysis, companies can more confidently identify the price ranges within which new pricing strategies are likely to be profitable, and so reduce risk.*

Pricing decisions are critical to competitive success. Should you aim high, hoping to generate big margins, or low, aiming to increase volume? How can you work out which is most profitable? What should you do if you want to reposition your products, or your costs increase? And how should you react if one of your competitors alters its prices?

The key distinction to remember is that while customers determine the price you can →

charge, costs determine whether it will be profitable. When looking to improve pricing strategy managers need to be able to answer two questions:

- What will my customers do? and
- What does that mean for my profitability?

To answer the first question, which addresses customer behaviour, requires analysis of price sensitivity or "the price elasticity of demand". This is a measure of the change in the volume of sales that follows from a change in price: for example, if price rises by 10% and sales fall by 20%, the price elasticity is (minus) two. Since this kind of analysis is critical to many competition cases, there is a good deal of literature on the subject.

All the same, it may not yield clear answers. The price sensitivity of customers may be hard to ascertain – perhaps because the product is new, or the data does not permit accurate estimation. Moreover, there are a number of different ways of estimating such elasticities, and it is rare that they yield exactly the same answer. The second question then becomes even more important. Much less has been written about the issues involved, which are the subject of this bulletin.

### LOOKING AT THE INCREMENTAL MARGIN

The starting-point for analysing the link between profitability and price sensitivity is to estimate how costs may vary with different sales volumes. Most firms know prices should be driven by willingness to pay. Cost-plus pricing is seldom the best approach. However, price-setters sometimes have trouble in squaring the relationship between cost and demand, not least because costs are analysed by the finance department, while the concept of willingness to pay is the property of the marketing department.

Only those costs that vary with sales volumes – the so-called incremental costs – are important in setting a pricing strategy. If other costs (fixed, non-incremental or sunk) drive decisions, profits are unlikely to be maximised. Moreover, commercial incentives within the firm may well be distorted.

Incremental costs, however, are not always easy to calculate. Many companies do not calculate costs in the appropriate form. A good deal of work on the available data may be needed – and it may be necessary to rely on some assumptions. Such effort usually pays off: it is better to use an approximation of the right measure than to base your analysis on the wrong one.

Having estimated the incremental cost, at current sales volumes, it is possible to investigate the impact of changes in price and volume on costs and profits. A useful way of doing this is to identify the contribution margin. This margin is a measure of the sensitivity of a product's profits to a change in its sales volumes. Knowledge of the contribution margin enables managers to calculate the additional sales that would be needed to maintain the same level of profit following a price cut. Alternatively, it allows them to calculate how much volume they can afford to lose if prices are raised.

The contribution margin can be calculated by taking the difference between price and incremental cost, and then dividing this by the price. The table provides two examples. It shows that while the profit margins on products X and Y are the same, the contribution margins are very different. Product X has higher incremental costs, and so a much lower contribution margin, than Product Y

If sales volumes fall, the costs of Product X fall much faster than those of Product Y and the impact on the profitability of Product X is less. If volumes rise, the opposite is true: Product Y will be making a much higher contribution than Product X on each additional sale. In short, for any given change in sales volumes, the impact on the profitability of Product Y will be greater.

This relationship can be expressed another way. For any given price increase, a business can

## Elastic profits

Contribution margins		
Expressed as a % of price	Product X	Product Y
Price	100	100
Incremental costs	60	20
Fixed or sunk costs	20	60
Net profit margin	20	20
Contribution	40	80
<i>Contribution margin (%)</i>	<i>40%</i>	<i>80%</i>

withstand a larger reduction in the sales of Product X than of Product Y. And for a given price cut, it would need to generate more additional sales of Product X than of Product Y.

Chart 1 develops this analysis to plot a break even sales line for each of the two products. This illustrates the change in sales required to deliver the same level of contribution across a range of possible changes in price. This form of break even analysis, based on incremental changes to profit and the use of the contribution margin, can be extremely valuable to pricing managers. It is easy to set up and it provides an immediate context in which to assess different pricing scenarios.

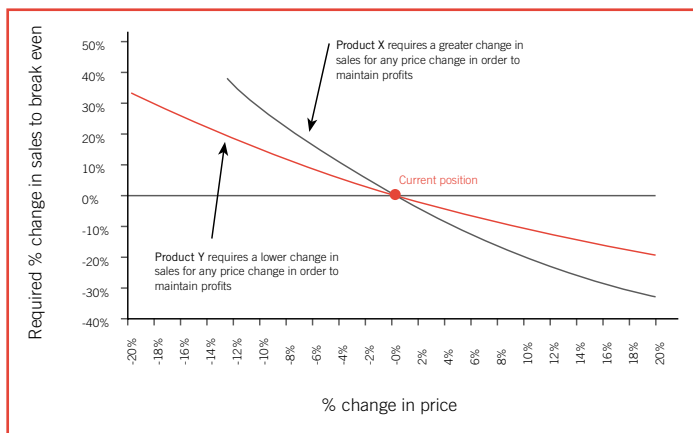


Chart 1 – Break-even sales for Products X and Y

### LINKING PROFITS TO ELASTICITIES

To discover whether the business will be able to generate the changes in sales necessary to break even, we now need to turn back to the customers and build in their likely responses to price changes - the "price elasticities of demand". Then we can construct the full analysis, using the contribution margin and the break even sales analysis, and examine the effect of a specific price increase on profitability under different assumptions about elasticities. Chart 2 shows an example for Product X with a 10% price increase.

This type of analysis is relatively simple to prepare once the contribution margin is known. It provides a clear link between what happens to profits under a specific price scenario, and the price elasticity of demand that would be needed for such profits to be achieved.

This ability to look at the impact of pricing decisions under a range of different price elasticities, and to identify the critical levels for profitability, is important precisely because these elasticities may not be easy to ascertain accurately (and they may be changing all the time). Inevitably, pricing decisions will have to be made on somewhat uncertain estimates but by using such break even analysis, firms can reduce, or at least assess, the risk of making inappropriate judgements about estimates of demand elasticity. For example, in the case illustrated by Chart 2, one could only be confident that a 10% price rise would be profitable if one had good evidence that the price elasticity of demand were less than (minus) two.

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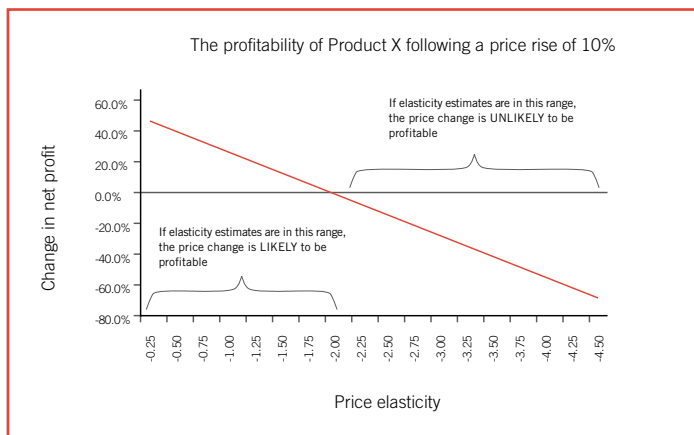


Chart 2 – Profits and price elasticities for Product X

This is consistent with the break even sales curve in Chart 1, which shows that Product X can withstand a sales loss of up to 20% following a 10% price increase (which implies an elasticity of two). However, the profit function shown in Chart 2 takes this analysis forward in two ways.

- It permits managers to test the impact of different assumptions about elasticities on the profitability of a price move.
- It can incorporate changes in variable or semi-fixed costs which might occur with large swings in volume. For simplicity, these are not shown in Chart 2, but are relatively easy to include.

#### CREATING A RISK-ADJUSTED APPROACH TO PRICING

The use of a contribution margin to analyse sales break even charts and profit elasticities can take some of the risk out of pricing decisions. What follows is a summary of the relatively simple process you need to go through in order to do this.

- First, calculate the incremental costs and contribution margin for the product(s) concerned.
- Second, calculate the break even sales volumes for a number of different price scenarios. From this, identify the scenarios that look plausible.
- Third, for each scenario, estimate how different price elasticities of demand correspond to different profit levels (including changes to cost structures if necessary).
- Finally, compare these profit functions with your existing knowledge of demand elasticities or other tests of price sensitivity.

A more dramatic use of this framework would be to work the process in reverse. That is to say, to estimate customers' willingness to pay for a specific product or service (analysing the attributes they require) and then to design the product in such a way to achieve the most profitable level of costs.

Either way, however, such a systematic approach to pricing does not remove the need for managerial judgement - no approach will or should reduce pricing to a mechanistic formula. But such an approach provides a way of testing such managerial judgements, helps to identify the risks associated with each and brings knowledge about customers and costs within a single robust framework for estimating profitability.

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