

TRADITIONAL MARGINS AND THE IMPACT OF A COST-SAVING INNOVATION

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ABSTRACT

Retailers tend to have a traditional level of mark-up and to charge the same mark-up even if the product is improved so that waste is reduced. Under these circumstances the result of improving a product is that producers sell less at a lower price, consumers buy more at a lower price and retailers obtain a larger percentage margin. The producers suffer as a result of their innovation. Excess capacity at retail may be caused.

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INTRODUCTION

Retailers tend to have customary levels of margin. For example, they may decide that 33% is the correct mark-up for vegetables, 15% for hard groceries and 10% for cigarettes and then continue to charge the same mark-up whatever the level of waste or turnover. The mark-ups on all lines within a product group tend to be the same: retailers commonly charge the same 33% mark-up for all fruits and vegetables: the expensive ones, the ones with high waste and the ones that require a lot of handling, as well as those that are prepriced and pre-packed. There seems to be little doubt that nearly all retailers have a traditional margin for all products (except those pre-priced by the manufacturer) in the short run, and our experience is that they maintain these margins in the long run for fruit and vegetables at least, in spite of major changes in the level of waste. A profit maximizer would charge a different margin on each line, allowing for variable costs, waste, elasticity of demand and so on, but, because of the time involved, the lack of information and the fact that supermarkets handle over 5,000 product lines, this profit maximization is impractical. Instead, those supermarkets which use sophisticated management techniques concentrate on trying to optimize allocation of shelf space with given margins.

The difference between the margin that the retailers charge, the theoretical margin, and the margin that they achieve, or actual margin, may be shown as follows. If a retailer buys 100 items at 12p and sells them at 16p, he is charging a mark-up of 33\13% and a theoretical margin of $(16 - 12) / 16$ or 25%. Normally, though, there is some waste because of poor packing, rough handling, natural decay, short deliveries or theft so the calculation then becomes:

100 items bought at 12p	1,200p
10 items discarded	0p
90 items sold at 16p	1,440p

$$\text{Actual Margin} = (1,440 - 1,200) / 1,440 = 16.7\%$$

Often retailers set the theoretical margin for the department or for the whole shop as

their goal and they try, by reducing waste and other leakages, to bring the actual margin as near to the theoretical margin as possible.

Figure 1 Supply and demand curves per unit saleable at retail

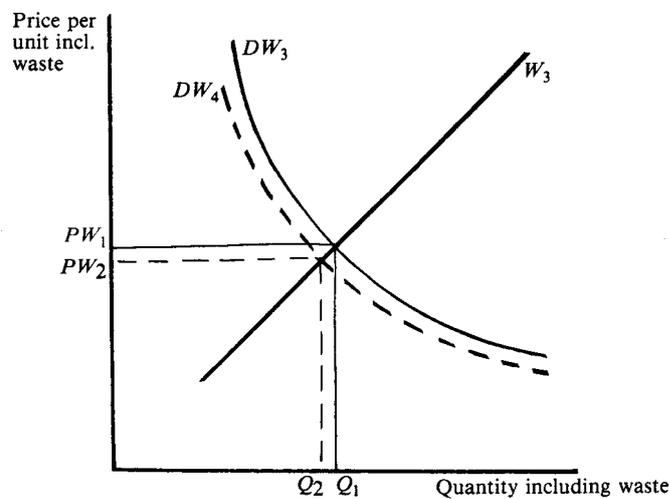
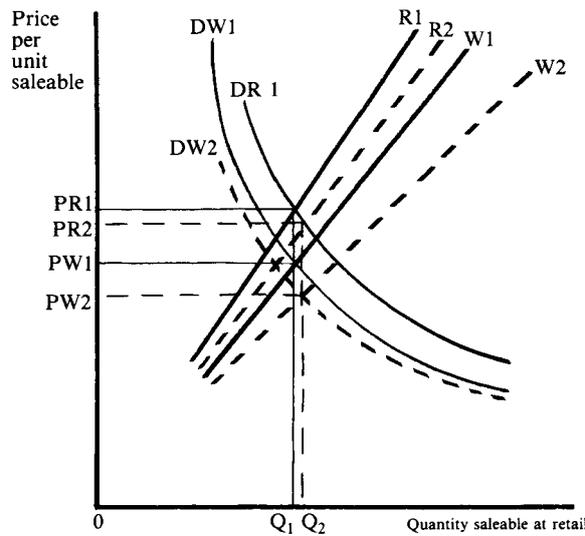


Figure 2 Wholesale supply and demand curves per unit including waste.

In this paper we consider the impact of a costless improvement in quality which has no effect except to reduce the level of waste at retail. The consumer cannot tell the difference between the new product and the old. Examples include an improvement in apple storage which reduces the level of in-store waste, and the use of Charolais bulls to produce carcasses with a higher proportion of saleable beef.

For illustration we take a situation where the total theoretical distributive margin is 25%, a mark-up of 33%. It is assumed that this percentage mark-up is charged whatever the level of waste. Initially 10070 of the product is wasted so the actual margin is $(0.9 \times 133.3 - 100) + (0.9 \times 133.3) = 16.67070$. With the improved product there is no waste and the mark-up remains the same, so the actual margin becomes 25070. This is the usual pricing strategy for fruit and vegetables. The retailer does not have to make any complex calculations; he just adds one-third to the purchase price. He does not have to work out the implications in terms of perceived supply curves: if he has too much in stock at the end of the day, he reduces his order next day. It is assumed that retailers buy in a perfect market but because of locational monopolies, etc. they can sell at different prices.

Table 1 Derivation of supply and demand curves shown with hypothetical data.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Original Wholesale Price	Original Retail Price per Unit Saleable	Original Wholesale Price per Unit Saleable	Original Amount Supplied (Incl. Waste)	Original Amount Supplied (Saleable)	Original Amount Demanded (Incl. Waste)	Original Amount Demanded (Saleable)	New Wholesale Price per Unit (Saleable)	New Retail Price per Unit (Saleable)	New Amount Supplied (Saleable)	Amount Demanded at Retail (Saleable)
10	13.3	11.1	100	90	2,700	2,500	10	13.3	100	2,500
20	26.6	22.2	200	180	1,389	1,250	20	26.6	200	1,250
30	40.0	33.3	300	270	925	833	30	40.0	300	833
40	53.3	44.4	400	360	694	625	40	53.3	400	625
50	66.6	55.6	500	450	555	500	50	66.6	500	500
60	80.0	66.7	600	540	463	417	60	80.0	600	417
70	93.3	77.8	700	630	396	357	70	93.3	700	357
80	106.6	88.9	800	720	347	312	80	106.6	800	312
90	120.0	100.0	900	810	308	278	90	120.0	900	278
100	133.3	111.1	1,000	900	278	250	100	133.3	1,000	250

Notes

- (a) Columns 1, 4 & 6 are arbitrarily chosen figures.
- (b) Column 2 is column 1 plus a mark-up of 33 1/3%.
- (c) Column 3 is column 1 x 1.11, to allow for 10% waste.
- (d) Column 5 is column 4 less 10% waste.
- (e) Column 7 is column 6 less 10% waste.

Derivation of Curves

- To get R_1 plot column 2 against column 5.
- W_1 plot column 3 against column 5.
- R_2 plot column 10 against column 9.
- W_2 plot column 8 against column 10.

- (f) As a result of the improvement, there is no waste, so the new wholesale price per unit saleable (Column 7) equals the old wholesale price for all items including waste (Column 1). That is to say the reported wholesale price remains unchanged.
- (g) Column 9 is column 8 plus a mark-up of 33%.
- (h) Column 10 is the same as column 4 because there is no waste.
- (i) Column 11 is the same as column 7 because there has been no change in consumer's tastes.

- To get DR1 plot column 2 against column 7, or column 9 against column 11.
- DW1 plot column 3 against column 7.
- DW2 plot column 8 against column 11.
- W3 plot column 1 against column 4.
- DW3 plot column 1 against column 6.
- DW4 plot column 8 against column 11.

The effect on the market supply and demand curves is shown in Figure 1, in which all quantities have been measured in terms of quantity sold at retail, in order to avoid the confusion that arises when some figures include the rotten apples, while others do not. *WI* is the original supply curve at wholesale, the number of saleable apples that the farmer is willing to provide at that price per unit saleable¹. *RI* is the original supply curve at retail. For any quantity, the supply price at wholesale, per unit saleable, is 11070 higher than the supply price for all units, including 10070 rotten; for any quantity the retail price is, by assumption, 33 Y3 070 higher than the supply price for all units: *RI* is, therefore $(133.3 \div 111.1) = 1.2$ times *WI*.

With the change in the product there is no waste, so the quantity on offer at wholesale is higher and the wholesale supply curve becomes *W2*. The amount offered at *W2* is not just 11.1010 greater than that at *WI*, because the price per unit falls at the same time as the amount of waste falls. However, *R2*, the retail supply curve with no waste, is 11.1 % further over than *RI*.

DR1 is the demand at retail in both periods: by assumption, the customer is not affected by the change in quality. *DW₁* is the derived demand curve per unit saleable at wholesale in the first period. Because 10% of the purchases are being wasted, the actual margin is 16.7% - Le. $(0.9 \times 133.3 - 100) \div (0.9 \times 133.3)$ - and *DW1* is 16.7% below *DR1*. When there is no waste the wholesale demand curve *DW2* is 25% lower because there is a 25% actual margin.

Figure 1 shows that the result of the improvement in quality is to increase the margin of the retailers and their total gross profit. The retail price per unit falls by an amount depending on the elasticities as the quantity sold increases. Since all prices are shown per unit saleable and all quantities are in saleable units, the effect on the producer is not clearly shown here, so it is shown in Figure 2.

In Figure 2, the actual quantities, including waste, are given, and the unit price is for all units including rotten. *W₃* is the supply curve in both periods (the number of boxes of apples remains unchanged even though the number of rotten apples falls). *DW3* is the demand at wholesale in the first period and *DW4* is the demand at wholesale in the second period. Because of the increased margin, the derived demand is 10% lower in the second period. As long as demand curves are negatively sloped and supply curves positively sloped, producers sell a smaller quantity at a lower price. If the retail demand (*DRJ*) is perfectly elastic, producers sell the same quantity.

The assumption that retailers have traditional margins and identical demand functions implies that the excess profit of retailers will not be competed away by price cutting. Instead, in the long run new retailers will enter the market and take a share of the trade. All firms still charge the same margin, but sales per shop are lower, so only a normal profit is obtained from each shop. This chronic over-capacity, with a large number of retailers operating at a low turnover per shop, is typical of greengrocers, butchers and small grocers, who all charge traditional margins.

DISCUSSION

The limitations of market margin analysis and the dangers of generalization from a model like this are too well known to need repeating. This scenario is based on a very specific model and the results are dependent on the assumptions, especially those on waste margins and competition. A realistic model of the beef market for instance would have to allow for many other factors such as the different cuts of meat sold and differences in butchers' cost curves. However, the assumptions in relation to levels of waste, margins and

¹ Table 1 shows how these curves are derived, using figures for a hypothetical market.

competition, are sufficiently close to conditions in the greengrocery trade to cause alarm. The predictions of the model, too, are in line with experience: there is chronic overcapacity in retailing, producers do not inevitably get richer as they produce a better product, and the increased price obtained for a better product often does not cover the increased production cost.

Whenever a product is improved in such a way that retailers' waste is reduced, the possibility should be considered that it will result in a fall in producer price and amount sold, and a large increase in margin. The innovators among producers are likely to benefit at the expense of others. The improvement may be important in maintaining the long-term viability of the industry, in keeping apples competitive with oranges. In the short run though, the marketing plan of the industry which improves its product in this way should include an attempt to persuade retailers to reduce the percentage markup, if the innovation is going to be of any benefit to the industry as a whole.

BIBLIOGRAPHY