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# The Role of Sale Signs

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## Abstract

Sale signs increase demand. The apparent effectiveness of this simple strategy is surprising; sale signs are inexpensive to produce and stores generally make no commitment when using them. As a result, they can be placed on any products, and as many products, as stores prefer. If stores can place sale signs on any or all of their products, why are they effective?

We offer an explanation for the effectiveness of sale signs by arguing that they inform customers about which products have relatively low prices, thus helping customers decide whether to purchase now, visit another store, or perhaps return to the same store in the future. This explanation raises two additional issues. First, why do stores prefer to place sale signs on products that are truly low priced (stores could use sale signs to increase demand for any of their products)? Second, how many sale signs should a store use; should they limit sale signs to just their relatively low priced products or should they also place them on some of their higher priced products? The paper addresses each of these questions and in doing so investigates how much information sale signs reveal.

Our arguments are illustrated using a formal game-theoretic model in which competing stores sell imperfect substitutes in two-period overlapping seasons. Stores choose price and sale sign strategies and new customers arrive each period and decide whether to purchase immediately or delay and return in the future (to the same store or a different store). Customers who delay purchasing risk that the product will not be available in the following period and incur an additional transportation cost when they return. Two factors balance these costs. First, customers correctly anticipate that the price will be lower if the product is available in the next period. Second, customers who return to a different store may find a product that better suits their needs. In deciding how to respond, customers use price and sale sign cues to

update their expectations about which products will be available in the next period.

Stores' sale sign and price strategies are entirely endogenous in the model, as is the impact of sale signs on demand. In our discussion we highlight the information revealed by sale signs, including the source of its credibility, its sensitivity to the number of sale signs that are used, and the resulting shift in customer demand.

We point to two key results. First, we show that the underlying signal is self-fulfilling: if customers believe that products with sale signs are more likely to be relatively low priced, then firms prefer to place sale signs on lower priced products. Second, we demonstrate that sale signs are self-regulating. Stores may introduce noise by placing sale signs on some more expensive products. However, if customers' price expectations are sensitive to the number of products that have sale signs, this strategy is not without cost. Using additional sale signs may reduce demand for other products that already have sale signs.

Our model is unique in several respects. First, we describe how stores use multiple signals to communicate with customers and recognize that customers vary in how much they learn from each signal. Price alone resolves uncertainty for some customers, but other customers use both prices and sale signs to resolve their uncertainty. Second, although previous signaling models have recognized that signals may be noisy (not always accurate), noise in these signals is typically exogenous, resulting from uncontrolled environmental distortions. In our model, stores endogenously choose to introduce noise so that sale signs only partially reveal which products are discounted.

Our explanations are supported by several examples. Although we focus on fashion products, our findings have application to any market in which customers are uncertain about relative price levels.

*(Sale Signs; Retailing; Pricing; Promotion Signals; Signal Jamming)*