Electronic Tickets, Smart Cards, and Online Prepayments: When and How to Advance Sell

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Abstract
Advance selling occurs when sellers allow buyers to purchase at a time preceding consumption (Shugan and Xie 2000). Electronic tickets, smart cards, online prepayments, and other technological advances make advance selling possible for many, if not all, service providers. These technologies lower the cost of making complex transactions at a greater distance from the seller's site. They also give sellers more control over advance selling by decreasing arbitrage. As technology enhances the capability to advance sell, more academic attention is vital. This paper strives to exploit these technologies by developing advance-selling strategies.

Until recently, advance-selling research focused on the airline industry and specific characteristics of that industry. These characteristics included the price insensitivity of late arrivals (e.g., business travelers) compared with early arrivals (e.g., leisure travelers), demand uncertainty across flights on the same day, and capacity constraints. Recent findings by Shugan and Xie (2000) show that advance selling is a far more general marketing tool than previously thought. It does not require these industry-specific characteristics. It only requires the existence of buyer uncertainty about future valuations. Moreover, sellers without the ability to price discriminate can use advance selling to improve profits to the level of first-degree price discrimination. This finding is important because buyers are nearly always uncertain about their future valuations for most services (e.g., the utility of next year's vacation or a future college education).

In this paper, we take the next step from Shugan and Xie (2000). We show that advance-selling profits do not come from buyer surplus, but from more buyers being able to purchase. We determine when and how to advance sell in a variety of situations, including situations with limited capacity, second-period arrivals, refunds, buyer risk aversion, exogenous credibility, continuous preference distributions, and premium pricing. We determine when advance selling improves profits and, when it does, how to set advance prices. We ask and answer seven questions. First, when should sellers advance sell? Second, how much can advance selling improve profits compared with only spot selling? Third, what factors impact the profitability of advance selling and how? Fourth, should advance prices be higher or lower or the same as spot prices? Fifth, how do capacity constraints impact advance-selling strategies? Sixth, should sellers limit the number of advance sales? Finally, what is the possible impact of buyer risk aversion?

First, we provide precise conditions when sellers should advance sell. For example, without capacity constraints, we show that sellers should advance sell when marginal costs are sufficiently low to make it profitable to sell to buyers with low valuations and sufficiently high to convince buyers that the spot price will be higher than the advance price.

Second, we find that advance selling can almost double the profits from optimal spot selling to early arrivals. We also show that advance selling has no impact on consumer surplus in markets with homogenous consumers and no capacity constraints. Therefore, advance selling can increase social welfare because seller profits increase.

Third, we find that two very important factors impacting the profitability of advance selling are seller credibility and marginal costs. Buyers only advance buy when they expect an advantage from advance buying over spot buying. Without capacity constraints, sellers must credibly convince buyers that the advance price is at a discount to the spot price. We show that this condition is met under different circumstances. For example, large marginal costs can create credibility because buyers believe that these costs will lead to high spot prices.

Fourth, we find (although optimal advance prices can be at a discount to the spot price) that sometimes a premium is optimal. Premiums are optimal when capacity is large (but limited) and marginal costs are not too large. Buyers advance purchase at a premium to spot prices when capacity is limited and spot prices are low. (Note that this is not a risk premium, and risk aversion is not required.) No prior research has suggested this strategy because that research relies on the assumption that early arrivals are more price sensitive than later ones. Without that assumption, premium advance pricing is sometimes optimal.

Fifth, we find that binding capacity constraints can impact the profitability of advance selling in opposite ways. On one hand, capacity constraints create seller credibility. Buyers believe that spot prices will be high when they know spot capacity is limited (and, perhaps, more limited by advance sales). On the other hand, when capacity is limited, the need to increase sales from discounted advance prices diminishes.

Sixth, consistent with Desiraju and Shugan (1999) we find that limiting advance sales can be profitable, but only under restrictive conditions. These conditions are: (1) selling to all early arrivals would leave insufficient capacity in the spot period to sell to all second-period arrivals with high valuations, (2) the optimal spot price is high, and (3) marginal costs are sufficiently small to make advance selling profitable.

Finally, we find that buyer risk aversion can sometimes increase the profitability of advance selling.

Our findings provide precise guidelines for a large number of service providers that will have the technical capability to advance sell. For those service providers, advance selling provides a creative pricing strategy that can potentially provide substantial improvements in profits. (Pricing; Advance Selling; Advance Pricing; Tickets; State-Dependent Utility; Services Marketing; Dynamic Pricing)