

# Advance-purchase discounts as a price discrimination device <sup>☆</sup>

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## Abstract

In an intertemporal setting in which individual uncertainty is resolved over time, advance-purchase discounts can serve to price discriminate between consumers with different expected valuations for the product. Consumers with a high expected valuation purchase the product before learning their actual valuation at the offered advance-purchase discount; consumers with a low expected valuation will wait and purchase the good at the regular price only in the event where their realized valuation is high. We characterize the profit-maximizing pricing strategy of the monopolist. Furthermore, adopting a mechanism design perspective, we provide a necessary and sufficient condition under which advance-purchase discounts implement the monopolist's optimal mechanism.

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## 1. Introduction

Advance-purchase discounts (introductory offers, early-booker discounts) have frequently been used in the sale of products such as holiday packages, hotel rooms, rental car hires, airline tickets, and conferences. While one may argue that, in these examples, a firm's pricing policy is affected by limited capacity, capacity constraints are largely absent in the digital economy where the use of advance-purchase discounts is also common. For example, amazon.com offers large discounts for pre-release orders of DVDs. Similarly, Apple's iTunes offers exclusive bonus tracks for pre-release orders of music albums. A theory of advance-purchase discounts that is applicable to the digital economy should therefore not rely on limited capacity. In this paper, we provide such a theory, based on price discrimination.

The starting point of our theory is the observation that consumers are likely to face uncertainty about their valuation when the time of consumption is far ahead in the future. Consider the following two-period problem of a monopolist selling a product with a fixed consumption or delivery date and committing to a price path. Consumers can buy either at the early date (before individual uncertainty is resolved) or at the late date (after individual uncertainty is resolved). At the early date, consumers only know their expected valuation. Suppose that all consumers have the same expected valuation (but differ in their ex-post valuations). By selling the good at the early date only ("advance selling"), the monopolist can extract all of the expected consumer surplus (namely, by charging an advance-selling price equal to consumers' common expected valuation). Such an advance-selling policy is clearly profit-maximizing, provided it is ex-post efficient to sell to all consumers. However, if the ex-post valuation of some consumers is lower than the unit cost of producing the good, it might be better for the monopolist to sell the good at the late date only ("spot selling"). While spot selling does not allow the monopolist to extract all of the consumer surplus (because of heterogeneity in ex-post valuations), it yields an ex-post efficient allocation conditional on a given level of output. As shown by Courty [3], the optimal pricing policy of the monopolist consists in advance selling if the unit cost of production is below a certain threshold and in spot selling otherwise. Advance-purchase discounts (where some consumers purchase at the early date and others at the late date) cannot be optimal in this simple setting because consumers are ex-ante identical.

In our model, consumers differ in their expected valuations. If the monopolist offers an advance-purchase discount (i.e., an increasing price path), consumers face a trade-off: they can either buy early at a discount or else wait and make their purchasing decision dependent on the actual realization of their valuation. Consumers with a high expected valuation will optimally purchase the good at the early date whereas consumers with a low expected valuation will buy the good at the late date (provided their ex-post valuation exceeds the price of the good at that date). That is, by offering an advance-purchase discount, the monopolist effectively discriminates between consumers on the basis of their expected valuations.<sup>3</sup> We provide a necessary and sufficient condition under which the monopolist's optimal intertemporal pricing policy involves such an advance-purchase discount.

In the next section, we present our baseline model where the (binary) distribution of "shocks" to consumers' valuations is the same for all consumers, independently of their expected valuations. That is, we focus on consumer heterogeneity in expected valuations, abstracting from

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<sup>3</sup> For this discrimination to be effective, secondary markets should be closed down by the monopolist unless they can operate only at high costs for consumers. For instance, if the contract is personalized, a secondary market cannot be active.

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