

Problem Set #1

Due September 14, 2022

1. A monopolist can produce different versions of a good with different quality levels. The constant marginal cost of producing quality v goods is cv^2 with $c < 1$. The monopolist is selling to a continuum of consumers with types θ distributed uniformly on $[0, 1]$. The types reflect vertical heterogeneity in tastes: a type θ consumer gets utility $\theta v - p$ if she buys one unit of a quality v good at price p and zero utility if she does not buy. (Assume that consumers always buy at most one unit.)

(a) Suppose first that the monopolist can only produce a single quality level v . Solve for the monopolists' price and its profits as a function of c and v .

(b) What quality level would the firm choose in the model of part (a) if v were a choice variable?

(c) What quality level would a social planner choose if the social planner had the ability to choose both v and p ? Discuss how this compares with the outcome of part (b) and how we can think about this outcome in light of standard results on a monopolist's choice of product quality.

2. Consider a two-period durable good model. There is a continuum of consumers of unit mass with types $\theta \sim U[0, 1]$. In the first period, the monopolist is able to produce a durable good of quality s_1 at cost c . In the second period there is technological progress, so the monopolist can produce a good of quality $s_2 > s_1$ at cost c . A type θ consumer gets utility $s\theta - p$ in any period in which she consumes a good of quality s and pays p . Suppose that an efficient resale market exists at $t = 2$ so that high θ consumers can resell their used goods to lower θ consumers if they want to purchase a new good.

(a) What prices will the monopolist need to charge in equilibrium in the two periods if he wants to sell q_1 units at $t = 1$ and q_2 units at $t = 2$? What will be the price in the resale market for used goods in this case?

(b) Write down the monopolists' maximization problem and solve for the optimal pricing policy for a monopolist with commitment power assuming that the parameters are such that the monopolist wants to make sales in both periods. What conditions on s_1 , s_2 , and c are necessary for the solution you've found to be the true solution to the profit-maximization problem? How does this fit with what we saw about the solution to the durable goods problem in class?

3. Read at least the introduction and initial model description in Bergemann and Valimaki's 2006 *JPE* paper "Dynamic Pricing of New Experience Goods." Think about the paper in relation to Shapiro's 1983 *Bell Journal* paper "Optimal Pricing of Experience Goods." What shortcomings of Shapiro's paper do Bergemann and Valimaki try to address in their model? To what extent do their results reflect the main intuitions of Shapiro's analysis of what happens with "pessimistic" and "optimistic" beliefs? In what ways have they made special assumptions or taken steps backward from Shapiro's model in order to keep their analysis tractable?

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