

UC Berkeley
Economics 121
Spring 2006
Professor Joseph Farrell
Midterm 3: 18 April 2006

Suggested solutions.

1. Indicate whether each statement is true, false, or uncertain, and give a *brief* reason/explanation. (5 points for each.)

a. "If output goes up as a result of price discrimination, it follows that welfare also goes up."

Uncertain/False. Given a level of output, welfare decreases (because the output is less efficiently distributed among consumers). So welfare can increase only if output increases by a large enough amount. That is, welfare *may* go up if there is an increase in output. Note that if we know that welfare increased, that implies that output necessarily increased as well. (Equivalently, if we know output did *not* increase, then welfare did not increase.)

b. "When a firm discriminates via self-selection with two types of buyer, all buyers end up consuming inefficiently little of the good."

False. Under price discrimination via self-selection, the "high" type consumes the efficient quantity (and gets positive surplus), while the "low" type consumes less than the efficient quantity (and gets no surplus).

c. "If nobody under 30 buys opera tickets when tickets are priced without price discrimination, then output and welfare must rise if price discrimination between under-30s and over-30s becomes possible."

True. If nobody under 30 is buying opera tickets, then the opera company is optimizing using only the demand of the over-30s. If they are able to charge separately for each group (and there is no resale), the output and welfare of the over-30s doesn't change (and may even increase if serving the under-30 market if the opera company experiences economies of scale). The under-30s were not being served at all when there was no price discrimination, so their consumption and welfare increases when they participate in the market. Thus, overall, price discrimination increases both output and consumer surplus, as well as profits. [This answer assumes that the opera company isn't selling at full capacity before it starts to price-discriminate.]

2. Explain why:

- a. When a monopoly discriminates by charging different simple linear prices to two groups of customers (whom the monopoly can tell apart), the group with more elastic demand pays a price closer to marginal cost than the group with less elastic demand. (10 points)

Price discrimination between two identifiable groups by a monopoly is achieved by using the Lerner markup rule separately for each group of customers. So if there are two groups of consumers, the firm has two Lerner equations to satisfy:

$$\text{Group 1: } \frac{p_1 - c}{p_1} = \frac{1}{\varepsilon_1}$$

$$\text{Group 2: } \frac{p_2 - c}{p_2} = \frac{1}{\varepsilon_2}.$$

Suppose that the elasticity of Group 1 is larger ($\varepsilon_1 > \varepsilon_2$). Then, it follows

$$\text{that } \frac{1}{\varepsilon_1} < \frac{1}{\varepsilon_2} \rightarrow \frac{p_1 - c}{p_1} < \frac{p_2 - c}{p_2}$$

This says that the markup for Group 1 is less than the markup for Group 2. This is equivalent to saying that price is closer to marginal cost for the group with more elastic demand.

- b. That price pattern is a relatively efficient (or not too inefficient) way for an industry or a monopoly to collect profits. (15 points)

By distorting the price of the (relatively) inelastic consumer more, we are minimizing the loss associated with price distortion. Recall what it means for a consumer to have inelastic demand. Inelastic demand implies that a large change in price results in a small change in demand. So, by price discriminating in the way described in (1a), the firm is charging more to the group that has a smaller quantity response to an increase in price. The group that has a larger reduction in quantity demanded in response to a price increase receives the smaller increase in price.

The intuition of this is that the inefficiency from pricing above marginal cost ($p > c$) arises from the resulting reduction in demand. If the group has low elasticity, raising the price won't decrease the quantity demanded by much. If the group has high elasticity, Ramsey pricing tells us that we shouldn't have a high markup. Thus, roughly speaking, the total output is maintained as much as possible consistent with making the "required" profits. Ramsey pricing involves very similar formulae to the separate Lerner equations (but with a constant instead of the 1's in the numerators of the right-hand sides).

You might also have drawn a graph that illustrates this.

- c. If the monopoly is replaced by a duopoly, and price discrimination between the two identifiable groups of consumers persists, then part (b) is much less likely to hold than under the monopoly. (15 points)

Oligopoly price discrimination has different welfare implications than monopoly price discrimination. With oligopoly price discrimination, the prices charged to the two groups no longer reflect group elasticity – they now reflect residual elasticity. So, if the groups are differentially able to switch between the firms, the residual elasticity faced by each firm may not be the same as the elasticity of the group's demand overall.

Markups are now based on exposure to competition as well as on the elasticity of the consumers.

See the third problem set for an example of how oligopoly price discrimination can result in the more inelastic consumers paying a lower price. You might have referenced an example similar to this in your answer. You might have also shown how residual elasticity relates to market elasticity using the Lerner formula, as in the problem set.

3. Explain why a firm that sells two complementary products will tend to price them lower than if they were sold separately. Briefly explain how American Airlines' management accounting system reflected this logic. How does this help us understand how a high-cost established airline can drive out low-cost entrants while remaining profitable itself? (30 points; roughly ten on each bit.)

Firms that sell two complementary products will tend to price them lower than if they were sold separately because lowering the price of one product will result in increased consumption of the second product (definition of complements). A firm will sacrifice potential profit from one good to secure profits from the sale of the other good. You might think about this in terms of examples we did in class – grocery stores and parking; printers and ink cartridges; razors and blades. The profit margin of selling good 1 is equal to the margin on good 1 plus the margin on those sales of good 2 that were induced by the purchase of good 1.

American Airlines' (AA) management accounting system ("FAUDNC" or "Fully Allocated Earnings plus Upline/Downline Contribution Net of Costs") recognized that certain flights were complementary goods. For example, the flight from Wichita to Dallas had a value for the consumers interested in flying that route. It also had an additional value to consumers who were interested in connecting to/from another flight. In determining the benefit of the Wichita-Dallas flight, AA's system considered the price paid by passengers on that flight and also credited some of the revenue from other complementary routes. If a passenger flew from Wichita to Miami via Dallas,

part of the profit of the Dallas-Miami leg would be attributed to the Wichita-Dallas flight; without that flight the passenger couldn't have taken AA all the way to Miami.

Thinking about costs in this way, it is reasonable to expect that AA would give up some revenue on one leg of the flight to gain (more) revenue on another leg of the flight. The relevant comparison is whether price plus the contribution of the flight to other routes exceeds the cost of the route. If there is a great benefit to the second leg, it is possible that the first leg is worthwhile, even if its price is below the direct costs. If the entrant does not have an extensive network of flights, its cost structure (on, for example, a cost per seat-mile basis) can be lower than the incumbent's but its total value to the airline (price plus contribution to other routes) can be less than the incumbent's.