

Essays on Network Effects and Third-degree Price Discrimination

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Abstract

In this dissertation, we deal with two topics: network effects and third-degree price discrimination. These have long been considered in economics, and researchers are still working on related issues. Also, they are closely related in the sense that third-degree price discrimination is often implemented in markets for network goods. The aim of this dissertation is to reconsider existing results, and demonstrate what is thought to be robust can be overturned and explain the related economic phenomenon.

Chapter 1 is a general introduction, and reviews the literature on network effects and third-degree price discrimination and provides an overview of this dissertation.

Chapter 2, titled “Price and Quantity Competition with Network Externalities: Endogenous Choice of Strategic Variables”, revisits the firms’ endogenous choice of strategic variables in the presence of network externalities, and finds that if the rival goods are substitutes in demand, but the degree of network compatibility is large enough to outweigh the substitution effects, each firm chooses price as its strategic variable. This finding is a rare exception to the usual result that if the goods are substitutes, each firm would choose quantity as its strategic variable. Moreover, we show that two non-standard results hold when the above condition is satisfied and the efficiency difference between the two firms is large. First, the price of the less efficient firm is higher under price competition than under quantity competition. Second, in a situation where one firm sets quantity and the other firm sets price, the profit of the more efficient firm is higher when it is the quantity-setter than when it is the price-setter, and the opposite is true for the less efficient firm. Our result regarding with the choice of strategic variables implies that, in the market for mobile phones and faxes where firms constitute an industry-wide network, price competition is likely to occur.

Chapter 3, titled “Price Discrimination with Network Effects: Different Welfare Results from Identical Demand Functions”, and Chapter 4, titled “Pareto Improving Third-degree Price Discrimination with Network Effects”, analyze the welfare effects of monopolistic third-degree price discrimination in the presence of network effects. An important difference between Chapters 3 and 4 is that the former assumes that all consumers have the same valuation on network effects, while the latter introduces the asymmetry that consumers in different markets have different valuation on network

effects. In Chapter 3, we show that the welfare effect of third-degree price discrimination depend on what kind of network effects are present—between markets or within markets. Different combinations of parameters that determine the strength of network effects within and between markets induce the same demand functions; however, measured consumer surplus and social welfare based on the demand functions vary across these parameters. This result indicates that welfare analysis of markets with network effects must be based on consumer utility functions that parameterize the network effects, and not on demand functions that, although sufficient to describe monopoly price-setting, mask the impact of network effects on consumer welfare. In addition, in empirical studies, it is not enough to estimate demand functions; it is also necessary to estimate the network structure in which consumers benefit. In Chapter 4, we consider that consumers benefit from the positive effects exhibited by users' networks encompassing all markets. Through positive network effects, consumers' utility rises as the number of users (i.e., total output) increases. This feature of network effects brings about an unfamiliar welfare consequence of price discrimination: Pareto improving third-degree price discrimination no longer requires that prices decrease in both markets. We provide a sufficient condition for Pareto improvement under a general model, consistent with this claim. We then demonstrate a simple example—a linear model, in which two separate markets differ only in their strength of network effects—in which price discrimination can achieve Pareto improvement with below-marginal-cost pricing. Our results imply that Pareto improving is more likely to be occurred than previously thought, and it could accompany with below-marginal-cost pricing that conflicts with regulation policies like anti-dumping policies. Therefore, to choose regulation policies, it will be necessary to clarify what kind of situation has given rise to below-marginal-cost pricing.

Chapter 5, titled “Successive Monopoly and Third-degree Price Discrimination in Final Good Markets”, examines the effect of third-degree price discrimination in final good markets within a successive monopoly structure, and finds the novel result that the downstream monopolist can prefer uniform pricing to discriminatory pricing. We show that a monopolist that can set different prices in each of two separate final goods markets may realize higher profits by pre-committing to uniform pricing, that is, setting the same price in both markets. This novel result arises because of the strategic effect of the uniform pricing commitment on the wholesale price set by the upstream monopolist, from which the downstream monopolist buys its intermediate inputs. Specifically, the upstream firm is induced to set a lower wholesale price than it otherwise would to preserve the downstream firm's incentive to sell in both markets rather than in only one of them. This result implies that a final good monopolist may not have an incentive to create a system

that observes or uses consumer signals, such as age or occupation, to implement price discrimination. Moreover, this result indicates that committing to avoid price discrimination by adopting no-haggle or everyday low pricing can serve as an effective business strategy even if the firm has no direct competitors. Perhaps somewhat surprisingly, this result also implies that banning a downstream monopoly firm from practicing third-degree price discrimination can protect it from an upstream monopolist with market power.

Chapter 6 is conclusion, and briefly summarizes our results and discusses our limitations on each essay and directions of future research.