A note on how to sell a network good

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A B S T R A C T

I consider a monopolist in an industry with positive network externalities. The firm can screen heterogeneous consumers by offering multiple products. Screening captures a greater share of consumer surplus but also segregates consumers into multiple products, thereby lowering the total network surplus. Thus, screening is socially inefficient. I show screening is never profit maximizing: the monopolist offers a single product, but at an excessive price. Thus, excessive consumer segregation is unlikely to occur in industries such as online multiplayer games, financial exchanges and messaging software.

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1. Introduction

Airlines offer multiple products of different qualities (e.g., first class and economy) to screen consumers.[2] However, in industries with *positive network externalities*, a product's

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[2] See Mussa and Rosen (1978), Maskin and Riley (1984), Johnson and Myatt (2003).

quality is endogenously determined by its overall utilization. For instance, a financial exchange, a messaging software, and an online multiplayer game are worthless unless many users also use that product. In these industries, offering a menu of products would allow a monopolist to screen consumers, thereby capturing a greater share of consumer surplus. However, such screening would be socially inefficient because consumer segregation reduces the surplus generated through consumption externalities. This note shows that such inefficient segregation is never profit maximizing.

I consider a monopolist firm, such as an operator of financial exchanges. An exchange's quality derives from the liquidity generated by all the traders who join that exchange. Some traders ("experts") may have high valuation for liquidity, whereas others ("amateurs") have low valuations. The firm considers three possible product regimes. As a "baseline", the firm can offer a single exchange, priced such that only experts join it. A "segregated" regime would feature two exchanges, as well as prices such that experts and amateurs would join different exchanges. A "merged" regime would consist of a single exchange priced so that all traders would join it.

However, the segregated regime is never profit maximizing. To see why, consider changing from "baseline" to "segregated" (i.e., offering a second exchange to amateur traders). This change increases revenue from amateurs, who were previously excluded. However, experts must pay a lower price under "segregation," to preserve incentive compatibility. A necessary condition for profit to increase is that amateur valuations are higher than the market-share-weighted valuations of experts. Now consider a further change, from "segregated" to "merged" (i.e., merging all traders into a single exchange). The firm can no longer charge experts more than it charges amateurs. However, it can charge a higher price to amateurs, who now enjoy greater quality. In this case, a sufficient condition for profit to increase is that amateur valuations for quality are higher than the market-share-weighted valuations of experts. In sum, if "segregation" is feasible and more profitable than "baseline," then "merger" will be even more profitable than "segregation".

The model makes three main assumptions. First, offering fewer products does not increase cost, holding fixed the set of consumers being served. For instance, serving all traders with two exchanges is (weakly) more costly than serving all traders with a single exchange. Second, we assume positive within-product externalities. For instance, a trader's utility increases with the quality of the exchange she joins, but does not depend on the quality of any other exchange. Third, consumer preferences are private information. If the firm can simply prohibit experts from joining the amateur exchange, it can segregate traders without losing revenue on experts. In this case, segregation can be profit maximizing.

The result holds independently of the strength of network externalities, as long as these externalities are positive. Users can make heterogeneous contributions to product quality, and a given user can make different contributions to the quality of different products. A product's quality can be convex in total product utilization (increasing returns) or concave (congestion). There can be fixed costs per product offered or heterogeneous costs per individual served.