

DISSERTATION DEFENSE

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Strategic Analyses of User Generated Contents and Platforms

The commercialization of the Internet began only in 1995 but has since penetrated almost every aspect of the society far beyond its initial, very limited research and academic use. The Internet has drastically changed both culture and commerce enabling new ways of instant communication and social or commercial interactions among a vast number of people and businesses without the old, overwhelming geographic constraints. My dissertation consists of three essays that study the economic and strategic issues in the Internet technology-enabled markets.

My first essay studies consumer product reviews—one of the earliest forms of online user generated contents. Consumer reviews have now become widely available on popular online retailer websites as well as on many third-party consumer information sharing websites. Such reviews play a significant role in consumer buying decisions as they can help consumers resolve or reduce uncertainties about product features and qualities before their purchases. Online reviews are becoming increasingly important for newly introduced products or products from less well-known companies. For example, when Motorola introduced Droid, its first Android smartphone, in late 2009 to compete with Apple's iPhone, consumers had generally given very positive reviews on Droid's key features such as its high resolution touch screen and camera, multitasking capabilities, open Android platform, and built-in Google Navigation. Given the positive reviews, how should Motorola adjust its pricing, promotion, and advertising strategies? For instance, should Motorola view these reviews as free advertising and thus lower its advertising? Are there conditions under which Motorola may actually increase its advertising expenditure in spite of its favorable reviews? How should Motorola adjust the level of its promotional premium—goods offered to consumers either free or at a low cost as an incentive to buy a product—in response to its favorable reviews? Should it increase its price since favorable reviews have increased consumers' willingness-to-pay? How should other smartphone makers respond? How do reviews affect firms' profits?

In my first essay, I provide a normative, game-theoretic model to study how consumer reviews influence firms' advertising, product premium, and pricing strategies. My analysis shows several interesting findings. First, consumer reviews and firms' advertising should not affect their product premium strategies. Second, even though favorable reviews and advertising are *substitutes* with respect to increasing consumers' willingness to pay, the firm may actually consider them as *complements*, especially when advertising is expensive. Competitive firms' advertising responses to the availability of reviews are opposite: one firm will increase advertising whereas its competitor will decrease it. Third, the total industry advertising expenditure may increase even when both firms have positive reviews. Fourth, the effect of consumer reviews on the difference between firms' prices can be in the *opposite* direction to their effect on the relative separation between firms' perceived qualities. Lastly, because of the competitive responses in advertising, an improvement in a firm's reviews may hurt its profit and increase its competitor's profit.

In my second essay, I study an important phenomenon on online retail platforms (such as Amazon.com). While millions of products are sold on its retail platform, Amazon itself stocks and sells

only a very small fraction of them. Most of these products are sold by third-party sellers, who pay Amazon a fee for each unit sold. Empirical evidence clearly suggests that Amazon tends to sell high-demand products and leave long-tail products for independent sellers to offer. I investigate how the platform owner, facing *ex ante* demand uncertainty, may strategically learn from these sellers' early sales which of the "mid-tail" products are worthwhile for its direct selling and which are best left for others to sell. The platform owner's "cherry-picking" of the successful products, however, gives an independent seller the incentive to mask any high demand by lowering his sales with a reduced service level (unobserved by the platform owner).

I analyze this strategic interaction between the platform owner and the independent seller using a game-theoretic model with two types of sellers—one with high demand and one with low demand. I show that it may not always be optimal for the platform owner to identify the seller's demand. Interestingly, the platform owner may be *worse off* by retaining its option to sell the independent seller's product whereas both types of sellers may *benefit* from the platform owner's threat of entry. The platform owner's entry option may reduce the consumer surplus in the early period though it increases the consumer surplus in the later period. I also investigate how consumer reviews influence the market outcome.

In the third essay, I study the Internet-enabled ad-supported licensing model—one that is becoming more popular in many software and application services markets. With the tremendous growth in network-enabled mobile computing, many large companies are striving to make their devices or software systems as a platform on which a huge number of consumer applications or services can be offered by third-party developers or providers. For example, in Apple's App Store (for iPhone and iPad) and Google's Android Market (for competing AndroidOS-based smartphones and tablet computers), we see hundreds of thousands of free ad-supported applications as well as ad-free, paid applications. And it is also common that the same application is offered in both a paid ad-free version and a free ad-supported version. Even in some hardware markets, companies are beginning to test the ad-supported model. For example, Amazon.com has just announced that it will offer a cheaper ad-supported version of Kindle, its bestselling electronic reader. All aspects of the Kindle are the same only that for the ad-supported model, special offers and sponsored screensavers will display on its screensaver and at the bottom of the home screen (without interrupting reading on it). This may be Amazon's first key step in turning its Kindle eReader into an advertising platform. The ad-supported model is clearly an important phenomenon in these new technology and Internet-enabled markets.

I study the adoption of the ad-supported model in these software applications markets. I show that, ignoring fixed costs, it is generally sub-optimal for a monopolist to offer only ad-free software. If the per-user advertising rate is high relative to consumers' distaste for advertisements, the monopolist will offer only ad-supported software at a reduced price or for free; otherwise, it will offer both versions of its application. My analysis of a competitive vertically differentiated market, in which each firm adopts only one platform, shows that, unless one firm's product is far inferior, both firms are better off if either firm adopts the ad-supported platform than if neither does. When both firms can potentially adopt multiple platforms, I find that, under very general conditions, the low quality firm offers only ad-free software whereas the high quality firm offers both ad-free and ad-supported software. More interestingly, I find that even if *neither* firm earns any positive advertising revenue or only one firm does, *both* firms can benefit from the availability of the ad-supported platform. My analysis suggests that, in a quality differentiated software market with intense price competition, firms may have incentives to adopt the ad-supported platform even if their advertising revenue does not cover the fixed cost required for that platform.