



Platform competition and seller investment incentives

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ABSTRACT

Many products and services are not sold on open platforms but on competing for-profit platforms, which charge buyers and sellers for access. What is the effect of for-profit intermediation on seller investment incentives? Since for-profit intermediaries reduce the available rents in the market, one might naively suspect that sellers have weaker investment incentives with competing for-profit platforms. However, we show that for-profit intermediation may lead to overinvestment when free access would lead to underinvestment because investment decisions affect the strength of indirect network effects and, thus, access prices. We characterize the effect of for-profit intermediation on investment incentives depending on the nature of the investment and on which side of the market singlehomes.

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1. Introduction

How does the market environment affect manufacturers' investment incentives? It is well-known that, in general, manufacturers may underinvest in technology or marketing because they cannot fully appropriate the surplus that is generated when selling a product. However, little is known about the influence of market microstructure or trading environment on investment incentives. Addressing this issue is important, as we observe that most consumer products are not sold directly but via intermediaries. These intermediaries come in various forms. For example, retailers rent shelf space to producers; shopping mall developers rent stores to retail chains (or franchisees); trade fairs rent booths to exhibitors. In all these market environments, the prices for the goods to be traded are set by the "producers" and not by the intermediary.³ Similarly, Internet shopping sites list sellers on their platform. Intermediaries obtain revenues by charging for access to and usage of the platform. This is true not only for trading platforms, but also, for instance, for software platforms, which grant licenses to application software developers and charge users for access (by selling the respective operating systems).⁴

In this paper, we analyze seller investment decision in such market environments. More precisely, we analyze the following question: How does for-profit intermediation affect manufacturers' investment incentives? The central message

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³ Hagiu (2007) documents the move towards decentralized pricing in retailing—i.e., manufacturers obtaining control over retail prices. See, also, Nocke et al. (2007).

⁴ Such a software platform may be bundled with a hardware platform, as in the case of Apple computers, video-game platforms (offered by Sony, Microsoft and Nintendo), and Palm.

of the paper is that a manufacturer's investment decision is substantially affected if intermediaries strategically set access prices to their platforms. We elaborate on this message in a particular setting that is motivated below.

With the rise of B2B and B2C commerce, the above question has become even more relevant. Intermediaries may become active in different ways. They may set bid and ask prices and, therefore, alleviate search inefficiencies, which arise, for example, under random matching. The presence of a dealer-intermediary can be seen as an implicit screening device between seller and buyer types (see, e.g., Gehrig, 1993; Spulber, 2003). In many markets, however, search inefficiencies may be so pronounced that buyers and sellers always trade via a platform. This is clearly the case if the platform provides part of a system that complements the product provided by the seller. A good example of this is the video-game industry (and other software industries), in which game developers write their applications for game platforms. In this case, a video-game platform aggregates demand and balances the two sides of the market through the use of price instruments (as in the literature on two-sided markets: see, e.g., Rochet and Tirole, 2003; Armstrong, 2006). In such a *platform industry*, we can abstract from any search efficiencies and, instead, focus on indirect network effects that arise due to group size.

We analyze how seller investment incentives are affected by the presence of competing for-profit platforms. To this end, we present a stylized model with two-sided indirect network effects on two competing platforms. Participants on both sides of the market choose which platform to visit; we contrast different scenarios according to whether buyers and/or sellers are allowed to trade via both platforms (i.e., to *multihome*) or are restricted to use a single platform (i.e., to *singlehome*). We capture size effects in the form of variety-seeking buyers who have a downward-sloping demand function for each available product. We may call trade taking place through for-profit intermediaries *intermediated trade*. These intermediaries set access or membership fees on both sides of the market. Conversely, in the absence of for-profit platforms that can restrict access and use of the platform, trade is *non-intermediated* or takes place via open trading platforms, which can be accessed without charge. As our benchmark, we choose a market in which buyers and sellers interact through two open platforms to which access is free of charge. While there are a number of real-world examples of open platforms (e.g., Linux as a software platform or PCs for PC-based video games), the main reason for doing so is conceptual: it uncovers the effect of strategic price setting by platforms on seller investment incentives. In a nutshell, to address the role of (imperfectly) competing intermediaries, we compare the seller investment incentives of two competing for-profit platforms with those of two open platforms.

Seller investments may, for example, take the form of cost reduction, quality improvement or marketing measures that facilitate price discrimination or expand demand. We model such investments as long-term variables that give commitment to the sellers—i.e., sellers make their investment decision before they know the opportunity cost of visiting each platform and before platforms set their prices. Take the video-game industry as an illustration. Software publishers reportedly invest in order to reduce their development costs and/or improve the quality of their games. For instance, in 2007, Ubisoft (one of the world's largest video game publishers) opened a new video-game development studio in Chengdu, China. The company chose Chengdu because it offers “long-term growth opportunities based on a talented and highly educated local population (with over 35,000 software programming graduates per year).”⁵ It seems reasonable to assume that investments of this kind are long-term decisions that software publishers make before knowing the exact “membership fee” that they will have to pay to the console manufacturer. This view is reinforced by the fact that console manufacturers regularly modify the price of their development kits.⁶

Why should the type of platform matter for seller investment incentives? Clearly, the presence of for-profit intermediaries reduces the rents that are available in the market. Therefore, one might naively suspect that sellers have unambiguously weaker investment incentives with intermediated trade. However, this ignores margin effects. Investments affect the distribution of gains from trade for buyers and sellers (i.e., the division of economic surplus within a buyer–seller pair) and, thus, the size of the network effects. This drives competition between for-profit intermediaries, which is reflected by the access fees. In particular, when innovations increase *buyer* surplus, intermediaries react to the corresponding investments by lowering access fees on the *seller* side. As a consequence, sellers internalize changes in buyer surplus if products are traded on for-profit platforms, whereas they do not in the context of open platforms. Thus, investment incentives can be stronger with competing for-profit platforms than with open platforms. The exact relationship between investment incentives and for-profit intermediation depends on which side of the market *singlehomes* and on the nature of the investment effort. In our linear specification with a finite number of sellers, we obtain the following results: (i) When both sides *singlehome*, trade via for-profit platforms raises seller incentives to invest in cost reduction and in quality, but lowers incentives to invest in price discrimination (and the effect depends on parameter values for investments in demand expansion); furthermore, in such a market, a social underinvestment problem with open platforms translates into a social overinvestment problem with proprietary for-profit platforms; (ii) when sellers can *multihome* and buyers *singlehome*, trade via for-profit platforms leads to *weaker* investment incentives,

⁵ Cited from “Ubisoft expands investment in China,” www.euroinvestor.fr, September 19, 2007. Third-party innovators also propose solutions to improve the game development process (e.g., Dassault Systèmes has released a tool, 3DVIA MP, that aids developers in producing high-end, 3D multiplatform games). See “Dassault Systèmes Unveils Première Development Authoring Platform for High-Quality,” www.3ds.com, February 20, 2008.

⁶ For instance, in November 2007, Sony slashed the price of the PlayStation 3 development kit by almost half—from \$20,500 to \$10,250 in the U.S. (see “Sony halves cost of PS3 development kit,” by Matt Martin, www.gamesindustry.biz, November 19, 2007). In March 2009, Sony further lowered the cost of its PS3 development kit to \$2,000 (see “Sony tries to boost PS3 development with dev kit price cut,” by Blake Snow, arstechnica.com, March 23, 2009).

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