

Impact of Secondary Electronic Markets on Information Good Suppliers

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Abstract

We develop an analytical framework to investigate the competitive implications of secondary electronic marketplaces which promote concurrent selling of new and used information goods. In secondary markets where suppliers cannot directly use second-hand goods for practicing inter-temporal price discrimination, the threat of cannibalization of new goods by used goods become significant. We examine conditions under which it is optimal for suppliers to operate in such markets, explaining why these markets may not always be detrimental to suppliers. Intuitively, secondary markets provide an active outlet for some consumers to sell their second-hand (used) goods. Such sales lead to an increase in their disposable income. This increased income can then be used to buy an additional new good. Thus the “income effect” can mitigate the losses incurred by suppliers from the direct “cannibalization effect” in the presence of secondary markets. We highlight the strategic role which used goods commission set by the retailer plays in determining profits for suppliers and overall channel power. Contrary to conventional wisdom, our model predicts the reduction in the price of new goods when such used goods markets are present. Further, we show that as the used good price increases, the new good price also increases. We conclude the paper by empirically testing two implications of our model using a unique dataset collected from the online book industry.

1 Introduction

“Amazon’s Used-Book Sales Upset Authors.” - *New York Times*, April 10, 2002

“Guild Recommends De-Linking from Amazon - The Author’s Guild, May 2002.

The recent establishment of e-markets by some retailers to sell used goods has resulted in a contentious debate about their potential impact on suppliers. For instance, publishers claim that e-tailing giant Amazon’s high-profile dissemination of used books eats into their often limited royalties and shortens the duration they have to generate new-book sales. This has prompted fears that publishers will be forced to raise the prices of new books, in order to extract as high a price as they can, during the one-time sale of a book. Amazon has argued that its used good marketplaces actually spur new sales. Complicating this argument is the fact that Amazon earns about the same from selling a new book as the commission it generates from the sale of a used

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book on its marketplace.¹ Thus the incentives of the retailers and the publishers are not aligned. In fact, revenue from the commissions generated from secondhand information goods (like books, CDs, DVDs, etc.), are proving to be a money-spinner for Amazon, and it is expanding its policy of paying commissions to its affiliates to include the sale of used goods.

A salient feature of some of these products is that once bought, many consumers derive a limited utility from keeping them and are willing to resell them if the transaction costs are negligible. Prior research has shown that electronic markets enabled by Internet technologies reduce transaction costs (Bailey 1998) and search costs (Bakos 1997). For buyers and sellers alike, electronic networks such as the Internet reduce the transaction cost of finding each other without regard to geographical constraints. In addition, buyers incur low search costs when they compare prices of new and used goods. Basically, the used good market provides a cheaper alternative for those consumers who cannot afford to buy the new goods. At the same time, it offers current owners an outlet to dispose used goods which still have market value. Since quality depreciation in such information goods is often minimal, consumers are finding it increasingly profitable to buy them.

Previous research has substantially advanced our understanding of how durable goods markets function (Bond and Samuelson (1984), Kahn (1986), Liebowitz (1982), Rust (1986), Benjamin and Kormendi (1974), Miller (1974), Anderson and Ginsburgh (1994), Waldman (1997), Aron and Sundararajan (1998), Hendel and Lizzeri (1999)). However, the digital economy is changing the nature of interactions in these markets. In contrast to physical products such as automobiles, we consider information goods such as books, CDs or DVDs where transaction frequency is much higher while quality degradation over a period of time, is relatively smaller. Our model simultaneously accommodates commonly observed phenomena, such as heterogeneity in consumer preferences, endogenous demand functions, quality depreciation and the degree of product substitutability between competing goods. Specifically, we examine the following questions. (i) Does the sale of used goods ever benefit suppliers when they cannot accrue any direct profits from secondary market sales? (ii) What is the impact of used goods on new good prices? (iii) What strategic implications do used good commissions set by the retailer have for suppliers' profits and prices? Before proceeding to discuss the model, we highlight three features that distinguish our work from prior research and lead to our main contributions.

First, in our model we consider two different types of a similar good, each being sold by two different suppliers via one common retailer. There exists an underlying heterogeneity in consumers' purchasing affinity for both goods. Hence the presence of secondary markets not only expands the demand for a specific type of good, but also opens up the possibility of some consumers purchasing a second good of another type. The duopolistic nature of the market motivates suppliers to compete even more strongly on prices. Further, the presence of a secondary market allows some consumers to replace their used goods of one type with new goods of the other type. We show that it is this concurrent buying and selling behavior of some consumers, that plays a strategic role in boosting suppliers' profits. Indeed, the existence of the secondary market enables some consumers to indulge in resales, which in turn leads to an increase in their disposable income. This increased income is then used to buy an additional new good, thereby benefiting suppliers.

Second, in our model suppliers do not accrue any direct gains from used good sales and hence they cannot directly use second-hand goods for practicing inter-temporal price discrimination. The

¹Wall Street Journal (July 22, 2002)

retailer which acts as an intermediary in our model, establishes the secondary market, sets the used good commission and captures all direct secondary market benefits. Consequently, its interests are not necessarily aligned with those of the suppliers. In such a scenario, the used good commission plays a strategic role by determining the precise change in consumers' implicit disposable income. From a managerial perspective, we show that despite the threat of cannibalization of new goods by used goods, a retailer has a strong incentive to establish a secondary market. While this is always detrimental for suppliers in a monopolistic market, a duopolistic secondary market leaves them better off, for a wide range of parameters. Further, we show that while increasing the used good commission by the retailer impacts suppliers favorably in a monopoly, it affects them adversely in a competitive scenario.

Third, some consumers derive a positive utility from holding the used good, which is different for a used good buyer viz-a-viz a used good seller. This feature, along with the duopolistic market structure where a supplier wants to sell its goods in competitor's market, enables suppliers to decrease their prices in the presence of a secondary market. This is in contrast to the conventional perspective, that new good prices tend to increase in the presence of a used good market. Further, we point out that irrespective of the nature of the market (monopolistic or duopolistic), an increase in the used good price leads to an increase in the new good price. Using data from Amazon.com, we provide empirical evidence which corroborates both these results.

2 Model

The model consists of two suppliers, S_A and S_B , selling goods A and B respectively, through one common retailer, to a unit mass of consumers, each in two different markets.² The product $i, (i \in A, B)$ that is marketed by each supplier is a durable that provides two periods of service. Thus a new good provides service for two periods irrespective of the period in which it is bought. A good is new when it is sold in period 1 and the same good is classified as used in period 2. In the first period, only new goods are available. In the second period, the retailer opens a used good market where consumers can buy and sell used goods with minimal transaction costs. The retailer sells both the goods, A and B, supplied by each of the respective suppliers. Whenever the consumer sells a used good (irrespective of whether it is type A or B), the retailer gets a commission k_U (where $0 < k_U < 1$) per used good sold while the rest $(1 - k_U)$ is the gain to the consumer. Similarly it gets k_N (where $0 < k_N < 1$) per new good sold, with the rest $(1 - k_N)$ going to the supplier. Without loss of generality, we also assume that the marginal cost of each good is zero for the suppliers.

Consumers are heterogeneous in their valuations of the good. Let θ be a consumer's valuation for a good, where $\theta \in [0, 1]$. The type parameter θ indicates a consumer's marginal valuation for quality. Buying a used good entails a cost of some degree of quality degradation. Without loss of generality, let 1 denote the quality of the new good and q denote the quality of the used good in period 2, where $0 < q < 1$. Thus q can be interpreted as the degree of inter-temporal quality degradation of the new good over two periods. If a consumer purchases a product of quality q at price p , his utility is $U(\theta) = \theta q - p$. That is, the increase in utility with quality is higher for consumers with higher valuations. Having bought a new good in period 1, consumers can either

²In our model, one can think of the two suppliers as two publishers selling 2 different books.

hold onto the good or sell it as a used good in the market in the second period. Intuitively, we would expect that for the same θ , a consumer holding the used good will derive less utility than a consumer interested in buying the used good. Therefore, we assume that while the buyer of a used good derives a utility of θq , the holder of the used good derives a utility of θh , where $h < q$.

There are two types of consumers. Type *A* consumers have θ valuation for good *A* and $\alpha\theta$ valuation for good *B* where $\alpha \in [0, 1]$. Similarly, type *B* consumers have θ valuation for good *B* and $\alpha\theta$ valuation for good *A*. The parameter α is the degree of consumers' affinity for the other product such that the higher the value of α , the more intense is the competition between the two suppliers for inducing the consumers to buy their goods. When $\alpha = 0$, consumers strictly prefer the specific good $i \in (A, B)$ according to their respective types. However, $\alpha > 0$, implies consumers have an incentive to buy both the goods. The game is modelled as a multi-stage process across two periods.³ We consider a subgame-perfect equilibrium of this game using backward induction.

3 Results and Empirical Evidence

Proposition 1: There exists an α such that for all $\alpha \in [0, \alpha_{dm}]$, supplier profits in the presence of the secondary e-market are higher than profits in the absence of it.

Proposition 2: There exists an α such that for all $\alpha \in [\alpha_{dm}, 1]$, suppliers' optimal new good price and profits in the duopolistic secondary e-market are higher than the price and profits in the monopolistic secondary market.

In addition to these results, our analytical model provides us with two testable assertions.

Hypothesis 1: *The establishment of a secondary market leads to a decrease in the new good prices.*

Hypothesis 2: *Given the presence of used books, all else being equal, an increase in the used good price leads to an increase in the new good price.*

The online used book market provides a rich arena to test the robustness of these two results. It is one of the fastest growing industries on the Internet. Online book sales grew from essentially nothing in 1995 to more than \$2.5 billion in 2002 (Forrester, 2002). Today such sales make up between 7.5% and 10% of total book sales in the U.S. Our data set is compiled from publicly available information on new and used book prices on Amazon.com. The data is gathered using automated java bots to download and parse HTML pages from the retailer website. The data was collected once each day and covers the time period from September 1, 2002 to March 1, 2003 and from April 2004 to July 2004. Currently, it includes about 3.6 million observations for 400 individual books.

Our panel of books includes 80 books from each of five major categories - New York Times (NYT) best sellers, former New York Times best sellers, Amazon Computer best sellers, best selling TextBooks, and New and Upcoming Books. For each of the books tracked (each book is uniquely identified by an ISBN number), we collect data on new book prices charged by Amazon.com as well as new and used book prices among Amazon.com marketplace sellers. Besides prices, for each offer listed, we collect the book's self-reported condition, and the seller's marketplace rating (a star

³A two-period structure allows us to study dynamic issues while retaining analytical tractability.

rating provided by prior customers). Since Amazon provides four different condition (or quality) levels of used books (Like New, Very Good, Good and Acceptable), our data includes all used book offers on a given date for each condition. Formally, we use the following terminology: Use2 for a book of quality “Like New,” Use3 for quality “Very Good,” Use4 for quality “Good” and Use5 for a book of “Acceptable” quality. Finally, we also collected the release date of each book and the number of used versions available every day for any given new book.

Given the nature of our data (cross-sectional plus time series) we use a fixed effects regression model to test our hypothesis. Therefore, we estimate

$$P_{AN} = \beta_0 + \beta_1 P_{NAN} + \beta_2 P_{Use2} + \beta_3 P_{Use3} + \beta_4 P_{Use4} + \beta_5 P_{Use5} + \beta_6 Datediff + \beta_7 SellerRating + \beta_8 Used Available + \epsilon.$$

The dependent variable P_{AN} , is the new book price of Amazon, while P_{NAN} is the new book price of non-Amazon sellers, that is, Amazon’s competitors who sell on Amazon’s marketplace. β_1 thus represents the cross price elasticity of Amazon’s new book price with respect to New Non-Amazon prices (P_{NAN}). P_{Usei} represents the minimum price of a used book of condition i , $i \in (2, 5)$ and β_i represents the cross price elasticity of new books w.r.t. used books. Since we estimate a fixed effects model, book specific idiosyncracies are captured in the fixed effect constant. The data supports both hypothesis H1 and H2.

4 Conclusion & Future Research

The ongoing debate between publishers and retailers has focussed on the supposed damage which secondary markets established by online retailers are inflicting on royalty payments and supplier profits. Amazon’s used good trend got off to an early start, with more and more consumers discovering that information goods like books, CDs and DVDs, which preserve their quality as well as any second-generation merchandize, could lead to significant cost savings. The insights from this model help to explain several interesting market phenomena including (i) the profitability of concurrent sales of new and used goods for suppliers, i.e., why used goods markets may not be detrimental for them (ii) the possibility of lower new good prices when there are secondary markets, under both monopolistic and competitive scenarios, (iii) the strategic role of used goods commission fees and their differential impact on equilibrium prices and profits for suppliers and retailers, under monopolistic vis-a-vis duopolistic markets, and (iv) the overall increase in social welfare that accrues from establishing such secondary markets, over a reasonably wide range of the parameters. Using data from Amazon, we test two of our assertions from the analytic model. Further, we also provide empirical estimates of the secondary market impact on new book prices, at various quality levels of used books. In our ongoing work, we are collecting similar data on CDs and DVDs to analyze the impact of secondary markets on these product categories. This will enable us to test the impact of other model parameters such as h and q on new and used prices, as ostensibly these parameters would differ among the three product categories.

5 References

A full list of **References** is available at www.stern.nyu.edu/~aghoose