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Anindya Ghose
New York University

Michael Smith
Carnegie Mellon University

Rahul Telang
Carnegie Mellon University

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PRICE ELASTICITIES AND SOCIAL WELFARE IN SECONDARY ELECTRONIC MARKETS

Anindya Ghose  
Stern School  
New York University  
New York, NY U.S.A.  
aghose@stern.nyu.edu

Michael D. Smith  
H. John Heinz III School of Public Policy and Management  
Carnegie Mellon University  
Pittsburgh, PA U.S.A.  
mds@andrew.cmu.edu

Rahul Telang  
H. John Heinz III School of Public Policy and Management  
Carnegie Mellon University  
Pittsburgh, PA U.S.A.  
rtelang@andrew.cmu.edu

Extended Abstract

Electronic exchanges have enhanced the viability of secondary markets including markets for used books. Online used book markets offer a wider selection, lower search costs, and significantly lower prices than do physical used bookstores. The increased viability of online used book markets has caused concern among groups such as the Book Publishers Association and Author’s Guild, who believe that used book markets will significantly cannibalize new book sales.

These propositions, while theoretically possible, are based on speculation as opposed to empirical evidence. In this research, we use a unique dataset collected from Amazon.com’s new and used marketplaces to estimate the impact of online used book markets on new book sales. Our analysis suggests that only 15 percent of used book sales at Amazon cannibalize new book purchases. The remaining 85 percent of used book sales apparently would not have occurred at Amazon’s new book prices. This low cannibalization means that book publishers lose approximately $32 million in gross profit (about 0.2 percent of total gross profit) from the presence of Amazon’s used book markets, while Amazon’s net revenues increased by $64.1 million dollars. Finally, consumer surplus increases by approximately $70.2 million. Thus, we find that the first-order impact of the availability of electronic used-book exchange markets at Amazon on total welfare is positive. Further, additional used book readership may mitigate author losses through increased revenue from secondary sources such as speaking and licensing fees.

Keywords: Publisher welfare, retailer welfare, consumer surplus, price competition, used books sales, electronic markets

Introduction

Information technology reduces the search and transaction costs for buyers and sellers to locate and trade products, and can thereby facilitate the creation of technology-mediated electronic exchanges. These exchanges allow sellers to easily reach a worldwide market and allow buyers to easily locate items that frequently would be unavailable in traditional physical stores.
Consumer-to-consumer exchanges represent one prominent area where the low Internet search and transactions costs have enabled product exchanges that would not have been viable in a comparable brick-and-mortar environment. For example, Amazon.com has recently started listing exchanges for used products, such as books, sold by individual customers alongside listings for Amazon’s new products.

There is, of course, nothing new about the sale of used products. In the United States, the first sale doctrine (17 U.S.C. §109) allows for the resale of copyrighted works such as books, and used bookstores are common in physical settings. Rather, electronic exchanges alter the scale and scope of what is possible with regard to the sale of used products. For example, in a physical environment, new and used books are typically sold in separate brick-and-mortar stores, raising search costs for customers who wish to compare prices between the two outlets. Further, brick-and-mortar used bookstores have limited inventory-holding capacity, which makes it difficult to stock a full range of new and used titles in the presence of customers with heterogeneous preferences toward used offerings. Finally, brick-and-mortar used bookstores only draw customers from a small geographic area, reducing the liquidity of these markets.

In contrast on the Internet, search costs to compare prices for new and used books are much lower than in brick-and-mortar stores. This is in part because used books can be listed side-by-side with new books either by retailers (e.g., Amazon.com) or by shopping agents (e.g., BizRate.com). Likewise, Internet retailers do not face the same geographical or physical constraints as do physical retailers. Thus, Internet retailers can attract buyers from across the world and can add additional listings to their book offerings at a very low cost, and in most cases don’t even have to take possession of the products. For example, Amazon.com allows anyone wishing to sell a used book to list his or her product on Amazon’s site. There is no listing fee, but if the book sells, Amazon pays the seller $2.26 to cover their shipping fees and takes a 15 percent commission on the sale of the item plus $1. Because of this, Amazon “stocks” at least one used book for of the vast majority the 2 million books in print, and for many out of print books as well; while a typical brick-and-mortar used bookstore stocks a total of between 5,000 and 30,000 titles.

Together, these characteristics appear to have caused an increase in the number of used books purchased online: the share of used books purchased online increased from 11.3 percent in 2001 to 54.4 percent in 2003 (Siegel and Siegel 2004).¹ These changes in used book sales have raised concerns among publishers and authors. Groups such as the Author’s Guild and the American Association of Publishers reason that since authors and publishers are only paid for the initial sale of a product, the increased selection and lower prices of online used book markets will cannibalize new book sales and cut into both publisher revenues and author royalty payments.

However, these concerns, while theoretically possible, remain untested and many potentially countervailing effects remain unexplored. For example, the availability of a resale market may increase user valuation of these goods and thereby increase the prices retailers are able to charge (Miller 1974). This is precisely what happened to prices for used textbooks following the large-scale introduction of campus used book exchanges. Likewise, there may be only weak demand linkages between the two markets such that easy availability of used book markets has little impact on new book purchases, but instead leads to increased purchases from highly price sensitive customers who would not otherwise have participated in the market.

We first analyze this question by developing a simple model to analyze the impact of used book markets on publisher and retailer welfare. Our analytic model suggests that publishers face two countervailing effects from used book markets: cannibalization of new book sales will reduce publisher and author revenue while the increased viability of used book sales may increase the willingness to pay of new book purchasers, allowing publishers to charge more for books and thereby increasing revenue. The critical factor to determining which of these two effects dominates is the cross-price elasticity of demand for new books with respect to used books, with low elasticities suggesting that publishers are less likely to be hurt by used book sales.

However, to date, the publishing industry has been unable to precisely measure this elasticity because both new and used book quantities sold through Amazon have been unobservable. For example, Tedeschi (2004) quotes Paul Aiken, the executive director of the Author’s Guild as saying, “There has always been used-book sales, but it’s always been a background noise sort of thing. Now it’s right there next to the new book on Amazon….We think it’s not good for the industry and it has an effect, but we can’t measure it” (emphasis added). Thus, this study represents the first attempt to empirically measure the impact of used book markets on new book sales and the resulting first-order impact on publisher, retailer, and consumer welfare.

¹As a point of comparison, the Internet accounts for only 12.7 percent of new book sales as of 2003 (Rappaport 2004).
Data

To do this, we use a unique dataset collected from Amazon.com’s new and used marketplaces to estimate the impact of online used book markets on new book sales. Our data are compiled from publicly available information on new and used book prices and sales rankings at Amazon.com. The data are gathered using automated perl scripts to access and parse HTML pages downloaded from the retailer. The data cover a 180 day period from September 1, 2002, to March 1, 2003, and a separate 105 day period from April 4 to July 21, 2004, and include over 9.8 million new and used price observations for 393 individual book titles.

This panel of books includes an equal number of books from each of five major categories—New York Times best sellers, former New York Times best sellers, Amazon Computer best sellers, best selling text books, and new and upcoming books. New York Times bestsellers were selected at random from the current New York Times list at the beginning of the sample and replaced as they were removed from the list. Former bestsellers were selected at random from bestsellers in the year 1999. Computer bestsellers and new and upcoming books were selected at random from the respective list at Amazon.com. Finally, bestselling textbooks were selected from the facultyonline.com bestseller list.

In early 2004, Amazon.com added a new variable to their XML data feed to developers, allowing us to obtain accurate measures of their used book sales. At this point, we created a similar sample of books, drawing 40 books from each of four categories: current bestsellers, former bestsellers, new and upcoming, and random. For each sample, we collect data on the Amazon.com sales rank (which serves as a proxy for quantity sold as described later), new book prices charged by Amazon.com, and the book prices by Amazon.com marketplace sellers. Our marketplace data includes the price, condition, and seller rating for each used book listed for sale. In the second sample, we were also able to add data regarding used book sales using Amazon.com’s XML data website.

Results

Until recently it was difficult to calculate the price elasticity for products sold on the Internet because, while the price of individual items could be readily observed, the quantity sold remained unobserved. Two recent papers address this problem by providing a way to map the observable Amazon.com sales rank to the corresponding number of books sold. In both cases, the authors find a stable relationship between the ordinal sales rank of a book and the cardinal number of sales, using roughly the following Pareto relationship:

\[ \text{Quantity} = \delta \cdot \text{Rank}^\beta \]  

Chevalier and Goolsbee (2003) calibrate this relationship and estimate \( \beta = -0.855 \). Brynjolfsson et al. (2003) calibrate this relationship using data from a book publisher mapping the Amazon sales rank to the number of copies the publisher sold to Amazon. Using these data they estimate \( \beta = -0.871 \). For the purposes of this paper, we will use Brynjolfsson et al.’s estimate because they are based on 861 data points as opposed to 2 data points in the experiments; however, our results are not particularly sensitive to this choice versus one of the other estimated parameter values.

Using this relationship, we can then estimate models of the form:

\[ \log(\text{Rank}_{bt}) = c + \alpha \log(P_{Abt}) + \Gamma' \log(P_{Mt}) + \Omega' X + \epsilon_{bt} \]  

where \( b \) and \( t \) index book and date. The dependant variable is the log of rank. The independent variables are Amazon price \( (P_{Abt}) \), a vector of Amazon marketplace prices \( (P_{Mt}) \), and a vector of other control variables \( (X) \). We do not include shipping and handling charges in our estimates because Amazon charges customers the same amount of shipping for new and used books, and thus the relative prices in our estimates would not change. Our control variables include the log of the time since the book was released, the condition of the lowest priced used book, the seller rating for the lowest priced used book, the log of the number of used books offered for sale for a particular book, and interaction terms for fiction, hardcover, and bestselling book types.

One can show from (2) that own-price and cross-price elasticity are given by \( \beta \alpha \) and \( \beta' \Gamma \) respectively. Thus, using \( \beta = -0.871 \), we see that Amazon’s own price elasticity is approximately \(-1.17\), while the cross-price elasticity of new book sales to used books prices is approximately \(0.088\). Both results have the expected signs. Amazon’s own price elasticity is close to \(-1\), which is consistent with what one might expect from a firm with significant market power. The cross-price elasticity estimates are quite low, suggesting that most Amazon customers are insensitive to the prices of used books.
These data suggest that only 15 percent of used book sales at Amazon cannibalize new book purchases. The remaining 85 percent of used book sales apparently would not have occurred at Amazon’s new book prices. This low cannibalization means that without raising prices, book publishers lose approximately $32 million in gross profit (about 0.2 percent of total gross profit) from the presence of Amazon’s used book markets. Further, the presence of used book markets raises Amazon.com’s gross profit by $64.1 million and raises consumer surplus by $70.2 million, resulting in a net welfare gain of approximately $102 million to society. Further, our analysis suggests that the losses to publishers and authors may be mitigated by two factors. First, as noted above, the increased viability of used book markets may increase the willingness to pay of new book purchasers allowing publishers to charge more in equilibrium for new books. Second, the additional readership gained through the used book markets may mitigate author losses to the extent that authors earn money from indirect sources such as speaking fees, licensing fees, and advances on future books.

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