

The Emerging Landscape for Retail E-Commerce*

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Online retail sales of goods and services are projected to grow from \$45 billion in 2000, or 1.5% of total retail sales, to \$155 billion in 2003, and to \$269 billion in 2005, or 7.8% of total retail sales projected for that year (Dykema 2000). In addition to this substantial growth in online sales, consumers increasingly rely on information collected online to research a lot of purchases that are concluded over traditional "bricks and mortar" channels, especially for high value durable goods, such as electronics and automobiles. Such purchases influenced by the Internet are estimated to grow from \$13 billion in 2000 to \$146 billion in 2003 and \$378 billion in 2005 (Dykema 2000), or 10.8% of projected retail sales. This would bring the total retail sales affected by e-commerce in 2005 to \$647 billion, or 18.5% of total retail sales.

Retail e-commerce is evolving to encompass a wide variety of goods and services. Leisure travel will be the leading category in 2000 with 27.2% of online sales, followed by books, music, videos and software (14.9%), computers and electronics (13.6%) and apparel (11.3%). By 2005, consumables (food, beverages, supplies, health and beauty aids, pet supplies, etc) are projected to amount to 18% of online retail sales, followed by apparel (16%), computers and electronics (12.4%), automobiles (12.2%) and leisure travel (12.1%), while the share of books, music, videos and software will fall to 9.6% (Dykema 2000).

Given the growing role that the e-commerce will play in retail markets, this paper focuses on how the Internet is affecting these markets, and how the resulting "digital markets" compare to conventional markets in terms of search costs, patterns of competition, mechanisms for price discovery, and types of intermediation.

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Reducing Search Costs For Buyers and Sellers

Buyers face search costs in obtaining and processing information about the prices and product features of seller offerings. These costs include the opportunity cost of time spent searching, as well as associated expenditures such as driving, telephone calls, computer fees and magazine subscriptions. Similarly, sellers face search costs in identifying qualified buyers for their products, such as market research, advertising, and sales calls.

Several Internet-based technologies lower buyer search costs. Many sites help buyers identify appropriate seller offerings: for example, search engines like Alta Vista, Yahoo! or Google.com; business directories like the one provided by Yahoo!; or specialized product and price comparison agents for specific markets, such as Pricewatch and Computer ESP for computers and components, Expedia and Travelocity for airline tickets and other travel products, Shopper.com and Yahoo Shopping for electronics, and Dealtime for books and music. On-line agents like the one provided by R-U-Sure.com monitor consumer behavior and help buyers identify the most desirable prices and product offerings without requiring them to take specific action. Internet technology can also lower the cost to buyers of acquiring information about the reputations of market participants. Such reputations may be provided as part of the marketplace (for example, on Ebay), or through specialized intermediaries, such as Bizrate (www.bizrate.com), which rates retailers on specific attributes (service, product quality, delivery promptness etc) by surveying consumers that have recently purchased products from these retailers.

The Internet lowers seller search costs as well, by allowing sellers to communicate product information cost effectively to potential buyers, and by offering sellers new ways to reach buyers through targeted advertising and one-on-one marketing.

By reducing search costs on both sides of the market, it appears likely that buyers will be able to consider more product offerings and will identify and purchase products that better match their needs, with a resulting increase in economic efficiency. But the reduction in search costs combined with new capabilities of information technology can set off more complex market dynamics, too.

Competition in Digital Markets

It may seem clear that lower search and information costs should push markets toward a greater degree of price competition, and this outcome is certainly plausible, especially for homogenous goods. On the other hand, on-line retailers can use Internet technology to provide differentiated and customized products, and thus avoid competing purely on price. I will explore these possibilities in turn.

The Benefits to Buyers of Greater Price Competition

Lower search costs in digital markets will make it easier for buyers to find low-cost sellers, and thus will promote price competition among sellers. This effect will be most pronounced in commodity markets, where lowering buyers' search costs may result in intensive price competition wiping out any extraordinary seller profits.¹ It may also be significant in markets where products are differentiated, reducing the monopoly power enjoyed by sellers, and leading to lower seller profits while increasing efficiency and total welfare (Bakos, 1997).

Some online markets may have lower barriers to entry or smaller efficient scale, thus leading to a larger number of sellers at equilibrium, and correspondingly lower prices and profits. In particular, certain small-scale sellers may have a brighter future in a wired world if they can identify appropriate niches, because they can more easily be searched for and discovered, as search costs online are less determined by geography.

It may thus be expected that online markets will have more intense price competition, resulting in lower profits as well as the passing to consumers of savings from lower cost structures. For instance, online shoppers may expect a 20-30 percent discount for items normally priced \$30-500 (Tedeschi 1999).

The Attempts of Sellers to Practice Product Differentiation

The dynamics of "friction-free" markets are not attractive for sellers. However, few goods are truly homogenous. As a result, online retailers can use technology to increase product

¹ Diamond (1985) and Stiglitz (1989) offer a discussion of search costs in commodity markets.

differentiation. This will lead to an increase in seller profits, which may partially or completely offset the decrease caused by lower search costs (Bakos, 1997).

As a starting point, online retailers can increase the number of product offerings and the information provided about each product, because they are not constrained by physical shelf space. This will be particularly true as merchants improve online store layouts, and as consumers acquire high speed Internet connections. The resulting increase in variety offers the possibility of customization -- that is, the ability to let each customer choose the desired set of product characteristics. Customization of conventional goods becomes especially possible when retail e-commerce is combined with modern production techniques that allow building-to-order.

Dell Computer is frequently mentioned as an example of how online ordering can allow consumers to customize their purchases, resulting in a much larger variety of product offerings than was available in the past. Consumers ordering a Dell computer online can customize several product characteristics, such as the processor, memory, capacity of hard disk, display cards, monitor, and so on, resulting in thousands of potential product variations. This product variety is made feasible because the purchased computer is manufactured after the order is placed, thus eliminating the need for Dell to carry inventories of all possible variations of its product offerings.

Information-rich products lend themselves to cost-effective customization. For instance, delivering an electronic newspaper tailored to the interests of an individual reader need not be more costly than delivering the same copy to all subscribers, while offering access to a much broader selection of news and resources than would be feasible to print and distribute physically.

Customization can be based on a set of preferences specified directly by the consumer, or more subtly, the features of the customized product might be deduced automatically. Technology allows the identification and tracking of individual consumers, both within an online store and across different websites. Profiling technologies allow the creation and sharing of consumer profiles, the matching of consumer identities with relevant demographic information, or comparison with the known preferences of similar consumers. Such techniques can be used to discover or estimate the preferences of specific consumers.

All these technologies make it possible for online merchants to assess their customers' preferences with significantly more accuracy than physical stores or catalog merchants. For example, product offerings can be customized and recommendations can be made based on a consumer's attitudes, past behavior and demographic characteristics, or through "collaborative filtering" systems that offer recommendations based on the feedback and experiences of consumers with a profile of likes and dislikes similar to the targeted consumer.

Merchants can also attempt to differentiate themselves and create switching costs for consumers through superior user interfaces with which consumers become familiar, or by employing systems that use past purchases or customer profiles to identify desired product characteristics. For example, systems like Amazon.com's book recommendation engine allow buyers to identify products that have their desired features, without focusing on the corresponding price. To the extent that new purchases provide information that will increase the accuracy of future recommendations, consumers may prefer to concentrate their purchases to one or few online retailers, effectively facing switching costs similar to those induced by loyalty programs such as frequent flyer miles.

In line with this type of argument, Degeratu, Rangaswamy and Wu (1998) find that price sensitivity is lower for online grocery shoppers than for shoppers in conventional supermarkets. Lynch and Ariely (1998) find that providing more product information to customers leads to improved product fit and reduced price sensitivity. However, while retailers may be able to charge a premium to exploit product differentiation and switching costs, this ability seems limited in the online world. For instance, consumers have been reported to shop on Amazon to take advantage of its superior user interface and product information, and subsequently purchase at lower priced Buy.com (Bank 1999).

Attempts of Sellers to Price Discriminate

When the ability to collect information about individual consumers and to differentiate products is combined with reduced "menu costs" of changing prices, online retailers have a greatly improved ability to price discriminate. The combination of creating market power through product differentiation, together with an ability to price discriminate, may offset the increased price competition brought by reduced search costs.

Even when sellers cannot identify the preferences of individual consumers, they can use “versioning” to induce consumers to reveal these preferences. Information products typically can be offered in several versions, each targeted to different consumers. For example, information can be delayed, access can be restricted temporally or geographically, products can be provided at different speeds, image resolutions, or functionality of interfaces. This practice of "versioning" allows sellers of information goods to price discriminate (Varian 2000), and is likely to become more frequent as e-commerce enables sellers to increase the information content of their product offerings.

Consumers typically resist being charged higher prices than other consumers for identical products. Thus, most price discrimination in retail markets will be accomplished either through versioning, or through targeted non-transferable coupons that offer customized discounts off a high list price.

The Mixed Evidence on Price Dispersion

Comparing the price level and price dispersion of online retail markets to traditional retailers can indicate the extent to which the ability for product differentiation and price discrimination may counterbalance the forces favoring price competition in digital markets.

In the most thorough study to date comparing online and conventional retailers for books and music, Brynjolfsson and Smith (2000) found evidence that online retail markets are more price competitive. In their study, online prices for books and CDs averaged 9-16 percent lower than in conventional stores, even after accounting for shipping and handling costs and local sales taxes. They also found that online retailers change prices in much smaller increments, while Bailey (1998) found that online price changes were more frequent. Thus, online markets seem more efficient in terms of lower price levels and lower menu costs.

However, a number of studies have found online price dispersion comparable to conventional markets when not adjusting for market share (Brynjolfsson and Smith, 2000; Clemons, Hann and Hitt 1998). While at present Internet markets are more concentrated than bricks and mortar markets, and thus dispersion is lower when adjusting for market share, high market share outlets do not have the lowest prices (Brynjolfsson and Smith, 2000). For example, Amazon had a market share of almost 80 percent in books in the period of their study, yet it charged a premium of almost 10 percent compared to the least expensive retailer.

This online price dispersion may reflect heterogeneity in retailer factors such as quality of service, brand and consumer trust. Also, it may be transitory. Some early studies of online retailers, for example, had found that in 1997 Internet book retailers were *more* expensive than conventional outlets (Bailey 1998); a result apparently no longer true.

New Mechanisms for Price Discovery

A key function of markets is price discovery, or determining the prices at which demand and supply clear and trade occurs. Mechanisms such as different types of auctions have been long employed in the financial markets. Other markets, such as the traditional auto dealership, employ negotiation between buyers and sellers until a price is agreed upon. In other markets, like the typical department store, merchants post a price that customers can either take or leave. E-commerce allows retail markets to employ new types of price discovery mechanisms, further complicating the possible dynamics of marketplace competition.

Web-based auctions at Onsale.com have created markets for consumer goods, such as computers, that function in a manner similar to financial markets.² Some airlines auction last-minute unsold seats to the higher bidders. Intermediaries like Priceline.com enable buyers to make offers to sellers, reversing the typical pricing dynamics of retail markets. In some cases, the authority to negotiate prices can be delegated to trusted software agents, which may allow sellers to dispense with firm nonnegotiable prices.

The ability to implement different price discovery mechanisms in some cases may result in more efficient markets, and thus benefit all participants and increase total welfare. In other cases, however, it may result in reduced gains from trade. It is known, for example, that bilateral negotiation with asymmetric information is generally inefficient (Akerlof 1970, Samuelson 1984). It is also unclear how the benefits will be distributed between buyers and sellers. As sellers move away from fixed pricing and all prices become negotiable, savvy buyers may

² Lower search costs will also enable new markets to emerge. For example, low buyer search costs and global reach have enabled ebay to create markets in goods like second-hand cameras where otherwise the search costs would be too high to allow potential buyers and sellers to find each other in a conventional market. While this impact is likely to be substantial in business-to-business e-commerce markets, it is likely to be rather smaller in the retail markets that are the focus of this paper.

benefit. However, when sellers are better informed, they are likely to increase their profits through better negotiating tactics and through price discrimination.

A key distinction here may be in whether the electronic market emphasizes comparisons of prices or of product characteristics. A system designed to promote price-shopping would facilitate obtaining price information, but might still require a higher-cost inquiry (such as a visit) to obtain detailed product information. For example, a buyer looking for a computer monitor can easily compare prices from a large number of sellers by connecting to Internet price search engines such as Shopper.com or Pricewatch.com, but then must face a larger cost in obtaining product information. In this case, the buyer must obtain and evaluate the monitor's specifications, assess the seller's reputation and return policies, and ideally locate a display model at a showroom or at a colleague's office.

If sellers can control the type of electronic market introduced, they should favor systems emphasizing product information rather than price shopping. A system designed to promote competition based on product features would make it easy to obtain information about product characteristics, but would discourage consumers from comparing prices. For example, high-quality multimedia product descriptions in standardized formats could help identify product offerings matching the buyer's preferences, while price information could be left out of these descriptions or could be obscured by offering a large number of prices and making it difficult for the buyers to figure out which one applies. Online airline reservation systems, for instance, make it very easy to identify a convenient flight between a pair of cities, but require substantial effort to identify the lowest applicable fare. In addition, the rules by which the fares and changes in fares are determined, which would help in planning purchases, remain largely opaque.

These new patterns of price discovery in retail markets will change the "microstructure" of consumer markets; that is, the methods by which buyers and sellers set prices. The microstructure of a financial market can affect both market efficiency and the division of surplus (Amihud and Mendelson 1986, Amihud, Mendelson and Lauterbach 1997). It may well prove a fruitful line of research to apply this type of analysis to online retail markets.

The Shifting Role for Intermediaries in Retail E-commerce

Online retail markets will be facilitated by intermediaries, but there are important questions about the role and functionality of these intermediaries.

In bricks and mortar e-commerce, typically a number of intermediaries handle distribution between the original producer of a product and the ultimate consumer: for example, a wholesaler, a distributor, a retailer, and sometimes a finance company to help with payment and an insurance company to offer service guarantees. It has been argued that as online marketplaces lower the cost of market transactions, it will become easy to match the original producer and the ultimate buyer directly, and as a result the role of intermediaries may be reduced, or even eliminated, leading to "disintermediation" (Gellman 1996).

While the growth of retail e-commerce may lead certain types of intermediaries to extinction, it appears likely that that online markets will more than compensate for this by promoting the growth of new types of intermediaries, leading to "reintermediation." One reason is that online markets are changing the constraints faced by sellers in designing their product offerings, fostering the emergence of new types of intermediaries that create value by aggregating services and products that traditionally were offered by separate industries.

For instance, a consumer in the market for a new car might select a make and model based on the experience from test drives, magazine research, and recommendations from friends. The buyer would then negotiate the price, order the vehicle, and take delivery through a car dealer, arrange financing through a bank, and purchase insurance from an insurance company. By dramatically lowering the transaction and distribution costs, the Internet has allowed intermediaries such as Auto-by-Tel or Microsoft's Carpoint to offer all of the above products and services, with the exception of the physical test drive. Similar intermediaries are emerging in other markets, such as Travelocity and Microsoft's Expedia travel services aggregators, or real estate websites that aggregate products and services related to real estate transactions.

The current patterns of retail intermediation seem certain to be substantially reshaped. For information goods such as newspapers, music, videos and software, distribution is likely to be transformed, as delivering goods over the Internet is likely to replace many physical distribution systems, leading to substantial disintermediation of wholesalers and distributors. This impact is already apparent in software retailing, and soon goods such as books and music

may also be delivered electronically as the physical component of mastering a CD or printing on paper can be carried out by the consumer or is superseded as in the case of electronic storage of music in MP3 players and text in e-books.

For some physical goods, direct sellers such as Dell Computer are likely to squeeze out traditional wholesalers and distributors. Traditional retailers will still play a substantial role, as a large fraction of customers value their service and convenience. However, even in markets for physical goods, markets increasingly value quick, just-in-time deliveries from manufacturer to final customer to reduce costs and time-to-delivery. The supply chains of traditional retailers are likely to be transformed so that they receive more goods directly from manufacturers, rather than through wholesalers.

Moreover, new intermediaries are emerging with expertise in running transportation and payment networks that will be especially important to retail e-commerce. For instance, FedEx and UPS have become major Internet intermediaries because of their logistics expertise and their economies of scale in distribution.

Some merchants will follow "click and mortar" strategies that will allow the integration of consumer experience across online and conventional channels. For example, a consumer may shop in a physical store, but order in a kiosk and have the purchase delivered at home; or a physical store can be used to return or exchange a good that was purchased online. The future for such strategies may be in strategic partnerships between online and conventional retailers.

Currently, electronic intermediaries often free ride on traditional intermediaries for certain services, such as providing the physical experience that is still important in many markets before a buyer can select an appropriate product offering. For example, consumers may test drive a vehicle at a traditional dealer, and purchase it at Auto-by-Tel. This free-riding cannot be sustained if electronic intermediaries gain a significant market share. For instance, when a consumer purchases a car at Auto-by-Tel, the auto manufacturer may pay a fee to the provider of the test drive, whether a traditional showroom or an alternative venue such as a car rental agency, essentially unbundling the traditional functions of an auto dealership. This type of arrangement would be unlikely in a traditional retail setting, as it would not be possible to collect the necessary information about consumer behavior.

The roles of intermediaries in online retail markets will also include providing trust relationships, ensuring the integrity of the market, matching customers and suppliers, and providing marketing information to suppliers. For example, intermediaries such as search agents may acquire power because of their ability to recommend products, create consumer trust, and their perceived neutrality. Also, intermediaries are emerging to help consumers evaluate nonprice information. For example, next generation search agents will include the ability to search and compare product offerings based on product features; Bizrate.com provides ratings of individual merchants; Consumer Reports and Epinions offer product reviews; Comparenet.com offers feature-based comparisons. Intermediaries will also collect information from consumers to keep track of merchant reputations. Credit bureaus and credit card companies will provide information or guarantee payment for consumers. Insurers will sell protection from opportunistic behavior or failure of other parties to deliver on their obligations.

In conclusion, while intermediaries that provide physical inventory buffers are likely to be squeezed by better demand information, manufacturing-to-order, and improvements in logistics, intermediaries that provide information-based services will play increasingly important roles in retail markets.

The Case of Information Goods

Digital information goods, such as news articles, digital images or music, can be reformatted and distributed almost costlessly via the Internet, while payment and distribution technologies are reducing the transaction costs for their commercial exchange. This creates new opportunities for repackaging content through strategies such as bundling, site licensing, subscriptions, rentals, differential pricing and per-use fees (Bakos and Brynjolfsson, 2000). All of these schemes can be thought of as ways to either aggregate or disaggregate information goods. For instance, aggregation can take place across products, as when software programs are bundled for sale in a software "suite" or when access to the various content of an on-line service is provided for a fixed fee. Aggregation can also take place across consumers, as with the provision of a site license to multiple users for a fixed fee, or over time, as with subscriptions. Conversely, Internet technologies will allow disaggregation in certain cases. Thus, software and other types of content may be disaggregated and metered according to use, such as on-demand software "applets" or individual news stories.

Bakos and Brynjolfsson (1999) show that aggregation of large numbers of information goods can result in both higher profits for sellers as well as a socially desirable wider distribution of these goods. This outcome occurs because of the ability of aggregation to change the shape of the demand function faced by the sellers. Specifically, as long as valuations for individual goods are not perfectly correlated, the law of large numbers dictates that when aggregating a large number of information goods, the distribution of the average valuation of the bundle will be increasingly concentrated around the mean. Thus, by selling as a bundle and pricing just under the mean valuation, sellers can increase their profits compared to selling the goods separately, while also reducing the resulting deadweight loss. This strategy is clearly only applicable to goods with very low marginal costs, such as information goods.

The emergence of an infrastructure that allows efficient digital distribution thus creates new roles for content aggregating intermediaries that will bundle large numbers of information goods. Deciding whether to aggregate information goods should be based on trade-offs among a variety of factors, including the ability of aggregation to affect the shape of the demand curve, the marginal costs of production, the transaction and distribution costs and the substitutability of the goods in the bundle. The impact of aggregating large numbers of information goods on consumer demand provides a framework to understand the emergence of aggregators of on-line content, such as America Online and Yahoo! It also provides an explanation for strategies that provide access to large bundles of content for a fixed fee, such as the music distribution deals between Napster and Bertelsmann announced in November 2000.

Electronic distribution will also have significant impact on the role of intellectual property rights. For example, the copyright system provides authors with certain property rights to encourage the creation of new content, while it limits the extent of these rights (through limited lifetime or exceptions such as "fair use") in an effort to minimize the deadweight loss incurred from a market price higher than the marginal cost of reproduction. In the world of disseminating information goods through physical media, such as books, videotapes, DVDs or CD-ROMs, copyrights are typically enforced by controlling the production of these media.

The technology infrastructure for electronic commerce destabilizes the existing copyright system in two ways. First, using technologies like Napster, individual consumers can undermine copyright protection by easily reproducing and distributing copyrighted materials on a large. This possibility may limit authors' incentives to produce content, and thus reduce long-run social

surplus. Second, authors can protect their intellectual property through contracts with individual consumers, or through technologies such as digital rights management, instead of relying on the copyright system. Such approaches can help the incentives of authors, but may increase deadweight loss and lower social welfare by extending the life of intellectual property protection or by subverting "fair use" provisions.

Welfare Implications

There are a number of reasons to believe that retail e-commerce will overall increase social welfare. It will benefit consumers by helping them enjoy lower prices and more choices. The savings on search costs for buyers and sellers are likely to be substantial. In markets with differentiated consumer tastes, lowering search costs can reduce "fit" costs resulting from consumers making suboptimal product choices (Bakos, 1997). Also, increasing the number of product offerings can result in a first-order increase in welfare (Hotelling 1929, Salop 1979). This result should hold especially true when the additional customization or versioning can be provided at very low or zero marginal costs. Even price discrimination can increase social welfare by increasing the number of purchasing consumers, and thus reducing deadweight loss. Similarly, bundling large numbers of information goods may increase total welfare by reducing deadweight loss (Bakos and Brynjolfsson, 1999).

The increased efficiency is likely to provide enough social gains for both consumers and producers to benefit, but the question of who benefits by how much remains to be worked out. Some consumers may pay lower prices. Others may not pay lower prices, but still benefit in convenience or breadth of selection. Still other consumers will see some of their surplus captured by retailers through price discrimination. These patterns will surely vary across types of goods. They may also vary across time: in the short run, benefits may be captured by the sellers who are early movers on retail e-commerce, but after a time, those benefits will likely be eroded by competition. Economic researchers, businesspeople and consumers all have a deep interest in how these forces will work themselves out.

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