Internet-based electronic marketplaces leverage information technology to match buyers and sellers with increased effectiveness and lower transaction costs, leading to more efficient, “friction-free” markets.

The Emerging Role of Electronic Marketplaces on the Internet

Markets play a central role in the economy, facilitating the exchange of information, goods, services, and payments. In the process, they create economic value for buyers, sellers, market intermediaries, and for society at large. Recent years have seen a dramatic increase in the role of information technology in markets, both in traditional markets, and in the emergence of electronic marketplaces, such as the multitude of Internet-based online auctions.

Functions of a Market

Markets (electronic or otherwise) have three main functions, summarized in Table 1: matching buyers and sellers; facilitating the exchange of information, goods, services and payments associated with market transactions; and providing an institutional infrastructure, such as a legal and regulatory framework, that enables the efficient functioning of the market.

In a modern economy, the first two functions are provided by intermediaries, while the institutional infrastructure is typically the province of governments. Internet-based electronic marketplaces leverage information technology to perform these functions with increased effectiveness and reduced transaction costs, resulting in more efficient, “friction-free” markets.

Matching Buyers and Sellers. Markets “clear” by matching demand and supply. This process of matching buyers’ demand with sellers’ product offerings has three main components: determining

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<td>-- Delivery of information, good, or service to buyer</td>
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<td>-- Transfer of payment to seller</td>
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<tr>
<td>- Trust</td>
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<tr>
<td>-- Credit system, reputations, rating agencies like Consumer Reports and Better Business Bureaus</td>
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<td><strong>Institutional infrastructure</strong></td>
</tr>
<tr>
<td>- Legal</td>
</tr>
<tr>
<td>-- Commercial code, contract law, dispute resolution, intellectual property protection</td>
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<td>- Regulatory</td>
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product offerings, search, and price discovery. The behavior of buyers, sellers, and intermediaries is motivated by their desire to maximize their private utility. When markets function well, this also leads to an efficient allocation of productive resources. Viewed this way, markets are the engine and steering system of our economy.

Markets provide sellers with information about demand that allows them to employ economic inputs such as capital, technology and labor, and develop products with characteristics that match the needs of buyers. Sellers determine a schedule of product offerings that they expect will maximize their profits based on:

- information about buyer demand;
- the cost of inputs;
- the available technology for production and distribution of the information, goods and services purchased by the buyers; and,
- the transaction costs of administering production, distribution, and payment.

Buyers select their purchases from the available product offerings after considering factors such as price and product characteristics. In obtaining and processing this information, buyers face search costs. These costs include the opportunity cost of time spent searching, as well as associated expenditures such as driving, telephone calls, computer fees, magazine subscriptions, etc. Typically, sellers exploit these search costs by raising their prices, and thus enjoy higher profits. Similarly sellers may face search costs in locating qualified buyers for their products, such as market research, advertising and sales calls.

A key function of markets in our economic system is price discovery, which is the process of determining the prices at which demand and supply “clear” and trade occurs. For certain markets, such as financial markets, this is their primary function. Markets can employ a number of mechanisms for price discovery. For instance, some financial markets use one or more of the several types of auctions to determine prices, such as the “call market” auction at the opening of a trading day at the New York Stock Exchange, when bids are accepted up to a certain time and exchange occurs when the market opens. This is the first price that is communicated via the stock market ticker to the market at large, kicking off a day of “continuous market” trading. Other markets, such as the traditional automobile dealership, employ negotiation between buyers and sellers until a price is reached. In still other markets, such as the typical department store, merchants make firm offers that customers can either take or leave.

Facilitation of Transactions. The matching function of a market establishes a bilateral relationship between a buyer and a seller. After a transaction is agreed upon, the product sold must be transported to the buyer (logistics), and payment must be transferred to the seller (settlement). Markets typically incorporate mechanisms for logistics and settlement: when a travel agent uses an airline reservations system to book a flight, the system will generate the itinerary and the ticket, and will process a credit card payment. Furthermore, market transactions require the establishment of a certain level of trust, which protects buyers, sellers and intermediaries from the opportunistic behavior of other market participants. For instance, this trust role may include banks issuing letters of credit, credit reporting bureaus, or rating agencies such as Consumer Reports and Better Business Bureaus, which keep track of product information and seller reputations, and thus discourage opportunistic behavior. Finally, markets provide the physical infrastructure that allows transactions between the buyers and the sellers to take place. This includes real assets such as physical structures and trading floors, computers and communication networks, and transportation systems.

Institutional Infrastructure. The institutional infrastructure specifies the laws, rules and regulations
that govern market transactions, such as issues related to contract law, dispute resolution, and intellectual property protection, and provides mechanisms for their enforcement. In addition, the dynamics of electronic markets may raise certain antitrust issues. For example, there are large economies of scale in distribution, as a single online retailer or intermediary can serve a very large market. There are also potential demand-side economies of scale in payment mechanisms and software. These may lead to a winner-take-all market structure \[1\] with one or a few firms dominating the market.

**How the Internet Affects Markets**

Electronic marketplaces, especially Internet-based markets, are having a major impact on the roles of markets discussed previously \[2, 12\].

**Product Offerings.** Two major emerging trends distinguish products in electronic marketplaces from their traditional counterparts: increased personalization and customization of product offerings, and the aggregation and disaggregation of information-based product components to match customer needs and to support new pricing strategies.

Electronic marketplaces support personalization and customization in two ways:

- **Consumer tracking technology allows the identification of individual buyers; information about these buyers, such as relevant demographics, consumer profiles, or comparison with the known preferences of similar consumers, can be used to discover or estimate their specific preferences.**
- **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.**

Current personalization and customization technologies use either rule-based systems like Broadvision (www.broadvision.com) that draw upon sets of expert rules, or collaborative filtering systems like the Firefly Network (www.firefly.net) that utilize the feedback and experiences of consumers with a profile of likes and dislikes similar to the targeted buyer.

This allows the practice of “one-to-one marketing,” which is based on understanding individual consumers. For instance, establishing a dialogue and a sense of community among customers can create value by enabling the sharing of experiences, problems and solutions, but also allows the collection of important information about individual consumers.

- **Purchasing a new home**
  - Research city and neighborhood
  - Find a house
  - Inspections, title research, appraisals, contracts
  - Get a mortgage
  - Moving services
  - Decorators, furniture, etc.
- **Planning a vacation**
  - Research destination
  - Arrange accommodations and travel
  - Purchase maps, books, information
  - Check out weather, items to take
- **Purchasing a car**
  - Research make and model
  - Select a dealer
  - Get a loan or arrange a lease
  - Purchase insurance

**Table 2. Components of consumer processes and transaction/distribution cost**

The ultimate objective is to provide customized services according to individual preferences, whether expressed or inferred. Increased selling effectiveness comes from being able to design appropriate products to address the needs of individual consumers, and from being able to identify the moment when a customer’s purchasing decision is most likely to occur and to be prepared for that moment, one step ahead of the competition.

When determining their product mix, sellers must decide which product components or features will be included in each product offering. For example, the developer of an operating system must decide which features to implement, and whether they will be marketed and priced individually or in a single bundle. These decisions are driven by the relative cost of different product bundles, which includes the following types of costs:

- **Production cost:** the cost of producing additional units for inclusion in the bundle, including storage, processing, and communications costs incurred in the process.
- **Transaction and distribution cost:** the cost of distributing a bundle of goods and administering the related transactions, such as arranging for payment.
- **Binding cost:** the cost of binding the component goods together for distribution as a bundle, such as formatting changes necessary to include news stories from wire services in a newspaper bundle.
- **Menu cost:** the cost of administering multiple prices. If a mixed bundling strategy is pursued, where the available components are offered in different combinations, then a set of $n$ goods may require as many as $2^n$ prices (one for each subset of one or more goods).
Internet marketplaces are changing the constraints imposed by these costs and thus are fostering new types of intermediaries that create value by aggre-gating services and products that traditionally were offered by separate industries. For instance, Table 2 shows the components of three processes that generate value for consumers. In traditional markets, these components are provided by separate industries. A consumer in the market for a new car might select a make and model based on the experience collected from test drives, research from auto magazines and Consumer Reports, and recommendations from friends. She would then agree on 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, distribution and binding costs, the Internet has allowed intermediaries such as Auto-by-Tel (www.auto-by-tel.com) or Microsoft’s Carpoint (www.carpoint.com) to offer all of these products and services, with the exception of an actual test drive.

Similar intermediaries are emerging in other areas, such as the Travelocity (www.travelocity.com) and Microsoft’s Expedia (www.expedia.com) travel services aggregators, or Microsoft’s Boardwalk Web site that will aggregate products and services related to real estate transactions.

**The Case of Information Goods.** Digital information goods, such as news articles, digital images or music, allow perfect copies to be created and distributed almost without cost via the Internet. The Internet is thus precipitating a dramatic reduction in the marginal costs of production and distribution for these goods, while micropayment technologies are reducing the transaction costs for their commercial exchange. Bakos and Brynjolfsson [6] point out that this creates new opportunities for repackaging content through strategies such as bundling, site licensing, subscriptions, rentals, differential pricing and per-use fees. All of these schemes can be thought
The ability to customize products, combined with the ability of sellers to access substantial information about prospective buyers, such as demographics, preferences and past shopping behavior, is greatly improving sellers’ ability to price discriminate—that
is, to charge different prices for different buyers. Price discrimination is a powerful tool that allows sellers to increase their profits, and reduces the consumer surplus enjoyed by buyers. On the other hand, price discrimination enables sellers to service buyers who would otherwise be priced out of the market, an outcome that increases economic efficiency.

These new types of price discovery, such as the ability of buyers to make offers and the ability to conduct electronic negotiations between buyer and seller agents, are changing the “microstructure” of consumer markets. Finance theory has shown that market microstructure affects both the efficiency of markets and the bargaining power of their participants. The increasing importance of electronic commerce emphasizes the need to carry this type of research analysis to electronic marketplaces. It is unclear who the beneficiaries of this process will be. The ability to implement different price discovery mechanisms may result in more efficient markets, thus benefiting buyers and hurting inefficient sellers. As menu costs decrease, sellers will move away from fixed pricing, and more prices will become negotiable [7]. While savvy buyers may benefit, the ability to negotiate prices may not be pleasant or result in a good deal, as many visitors to auto dealerships have discovered. Furthermore, when sellers are better informed, they are likely to increase their profits by charging different prices to different buyers. Economic theory predicts that buyers with more bargaining power, typically the more affluent ones, will fare better in this situation.

Facilitation. The cost of logistics—the process of transporting products from the seller to the buyer—has been estimated at more than 10% of the GNP [8]. Electronic marketplaces improve information sharing between buyers and sellers, helping lower the cost of logistics and promoting quick, just-in-time deliveries and reduced inventories. The distribution of information goods such as newspapers, music, videos and software, is likely to be completely transformed, as the information infrastructure will replace physical distribution systems. Sellers in Internet marketplaces are typically responsible for delivery to their customers, and increasingly contract with third-party providers for direct delivery from the manufacturer to the final consumer, reducing costs and time-to-delivery. Thus, direct sellers like Dell Computer are squeezing out traditional intermediaries such as wholesalers and distributors, while delivery providers such as FedEx and UPS are emerging as major Internet intermediaries, because of their logistics expertise and their economies of scale in distribution.

Electronic payment systems will further lower transaction costs in Internet marketplaces, and micropayment systems will lower the cost of small transactions, enabling new pricing strategies such as the metering of software use. As face-to-face marketplaces are replaced by electronic ones, there is increasing need to protect market participants from opportunistic behavior. Technologies such as public key cryptography can provide security and authentication of transactions, while intermediaries like Bizrate (www.bizrate.com) will use information from consumers to keep track of merchants’ reputations. Credit bureaus and credit card companies will provide credit information or guarantee payment for consumers. Finally, intermediaries like Verisign (www.verisign.com) are emerging as “certificate authorities” that match legal identities to the possession of cryptographic keys—a public key infrastructure.

Internet Marketplaces and Competition

Impact of Lower Search Costs. The ability of Internet marketplaces to reduce search costs for price and product information may significantly affect competition. Bakos [4, 5] shows that lower buyer search costs in electronic marketplaces promote price competition among sellers. This effect will be most dramatic in commodity markets, where intensive price competition can eliminate all seller profits. It will also be significant in markets where products are differentiated, reducing the monopoly power enjoyed by sellers, and leading to lower prices and seller profits. Figure 3 shows the equilibrium prices for a differentiated market.

Figure 3. The impact of buyer search costs in a differentiated market

As search costs fall from very high to moderate, new markets emerge, and both sellers and buyers benefit. However, if search costs continue to fall, market prices fall and sellers are made worse off, while buyers benefit from the lower prices and their improved ability to find products that fit their needs.
The dynamics of friction-free markets are not attractive for sellers that had previously depended on geography or customer ignorance to insulate them from the low-cost sellers in the market.
A key variable for such a system is the cost of product information relative to the cost of price information about the product. For instance, an electronic marketplace designed to promote price-shopping makes it easy to compare 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 on the Internet can easily compare prices from a large number of sellers, but then must obtain and evaluate the monitors’ specifications, assess the sellers’ reputations and return policies, and ideally locate a display model at a showroom or at a colleague’s office.

By contrast, an electronic marketplace can be designed to promote competition based on product features. 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 price actually applies.

**The Role of Electronic Intermediaries**

It has been argued that as friction-free electronic marketplaces lower the cost of market transactions, it will become easy to match directly buyers and sellers, and as a result, the role of intermediaries may be reduced or even eliminated leading to “disintermediation” (see [9, 10]). While the growth of Internet marketplaces may lead certain types of intermediaries to extinction, the discussion in the previous sections suggests that electronic marketplaces will more than compensate for this by promoting the growth of new types of electronic intermediaries. These intermediaries will perform functions that include matching buyers and sellers, providing product information to buyers and marketing information to sellers, aggregating information goods, integrating the components of consumer processes, managing physical deliveries and payments, providing trust relationships and ensuring the integrity of the markets.

Presently, Internet-based electronic intermediaries often “freeload” on traditional intermediaries for various reasons, such as the physical experience that is still important in several markets before a buyer can select an appropriate product offering. For example, car buyers may test drive a vehicle at a traditional dealer, and subsequently purchase it through Auto-by-Tel. This clearly cannot be sustained as electronic intermediaries gain a significant market share. Instead, the physical experience component might be unbundled to a physical intermediary. Auto-by-Tel, for example, may pay a fee to the intermediary where the test drive took place, a service that could be provided by a traditional dealership, but also by a specialized showroom or a car rental company.

Internet-based electronic marketplaces are still at a formative stage, and it is hard to fully predict their impact on the structure of markets. However, it is becoming clear that they will promote greater economic efficiency, and help sustain economic growth. In the process, they are creating major transformations, full of strategic opportunities for intermediaries ready to compete by adding value for buyers and sellers rather than by exploiting information asymmetries.

**REFERENCES**


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