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Six Myths of Information and Markets: Information Technology Networks, Electronic Commerce, and the Battle for Consumer Surplus[1]

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Abstract

The infusion of powerful information networks into business environments is beginning to have a profound impact on the nature of governance between buyers and sellers in the marketplace. Most articles in this area emphasize the benefits to the consumer side of the equation due to reduced coordination, search, and transactional costs. This article presents a broader view of information and markets by elucidating innovative ways that sellers can survive in intensely competitive markets. The article is framed in terms of six myths and counter-myths of information technology and effective markets. The myths provide a conventional view of how increased customization and outsourcing, open architectures, a larger customer base, and low price guarantees will benefit the buyer. The counter-myths illustrate that it is altogether feasible for IT to enable supplier strategies that extract consumer surplus. For instance, suppliers could use IT to price discriminate by tailoring product offerings and charging buyers as much as they are willing to pay. They could also segment markets making comparative shopping difficult, thus avoiding the competitive equilibrium. Also, suppliers could focus on the creation of networks that lock in customers or follow aggressive pricing strategies that deter price competition.

Both the myths and counter-myths are presented and examined in a polemical format using simple, fundamental economic arguments. We hope to provide provocative new avenues for discourse in this area by recognizing the complexity of interactions between buyers and suppliers in a highly networked environment.

Keywords: Electronic markets, networked markets, myths of markets, economic theory, seller strategies, buyer strategies, electronic commerce

ISRL Categories: AM02, BA01, CA10, GA01, HA0702

[1]Allen Lee was the accepting senior editor for this paper.

Introduction

A classic example of information technology that created strategic advantage is the ASAP system at American Hospital Supply Corporation (AHSC). This interorganizational system allowed hospitals to order their supplies directly through personal computers or mainframes linked directly to AHSC's mainframes. Customized information flow through this proprietary network created switching costs for the buyer hospital, thereby providing AHSC with monopolistic power. In 1985, AHSC was purchased by Baxter Travenol, which partnered with General Electric Information Services to create a hospital supply marketplace. Successive generations of ASAP created a more distributed market-based model that today involves many hospital suppliers (competitors of the old AHSC) and buyers involved in an end-to-end electronic commerce infrastructure for the hospital industry. This evolution is not unlike changes in other industries. For instance, American Airline's SABRE system, once a source of monopolistic rents for the provider, is now an independent profit center that facilitates an unbiased electronic market (Applegate 1995).

The rationale behind these consistent patterns can be found in increased industry competition, reduced technology costs, and increased interconnectivity of technology through open architectures. If we complement these trends with the recent explosion of almost ubiquitous infrastructures like the Internet, it is possible to argue for distributed market structures and consequently more effective markets. Indeed, such reasoning can be found through the lens of transaction cost economics, where information technology decreases coordination costs between buyers and sellers,[2] making market structures more viable (Malone et al. 1987). The power of Internet technologies to match buyers and sellers, share information, reduce search costs, and compare complex products has been argued to alleviate market imperfections, resulting in more effective markets (Bakos 1991a).

[2]The terms "sellers" and "suppliers" are used interchangeably in this document.

While hard evidence for such a definitive trend toward markets has been limited at best, some longitudinal observations indicate survival of monopolistic positions, despite significant infusion of information technology (Hess and Kemerer 1994; Lee 1998). However, no study to our knowledge has had the luxury of observing patterns of evolution on the Internet, a technology that involves a quantum leap in its reach, openness, and impact (Quelch and Klein 1996; Widdifield and Grover 1995). Morover, the gestation period for evolution of pure market structures is unknown, while the arguments for these structures remain vociferous and reasonable.

In this paper we seek to provide a broader view of information and markets. We do so by framing conventional arguments on how the free flow of information on Internet-like infrastructures should favor buyers, thereby improving market effectiveness. We then present plausible counter-arguments to illustrate possible supplier strategies that are now viable. With the new economics of information, these strategies may indeed impede market effectiveness. We expand current thinking by providing arguments for and against market effectiveness, presented in the form of "myths" and "counter-myths." They draw extensively from fundamental economic principles. Economic examples are also provided for illustrative purposes and not as a substitute for empirical research. *It is important to note that these alternative arguments and examples do not follow deterministically as the only possible deductions and conclusions from existing economic theory but represent altogether feasible strategies that economic actors can enact.* The intent here is simple: we wish to be provocative in impressing upon readers the complexity of interactions in networked contexts, and the need to broaden the scope of investigation when examining market effectiveness on the Internet.

The following sections provide background into fundamental economic theory of effective markets, the role of information technology, and general assumptions that are made in subsequent discussion. Examples and economic arguments for each myth and counter-myth of information and markets follow this. The final two sections discuss the implications and conclusions.

Microeconomic Theory of Effective Markets

A fundamental, comprehensive representation of a market is the aggregate demand curve (see Figure 1). It specifies the consumers' *reservation price*, i.e., the maximum amount they are willing to pay for each successive unit of the product. In practice, consumers pay only the *market price*, which depends on the degree of competition between suppliers and their ability to price discriminate between consumers. The difference between the reservation price and the market price (summed across all customers) is the *consumer surplus*. *Market effectiveness* may be characterized in terms of the division of this surplus between consumers and suppliers, where more effective markets are characterized as those that benefit the consumer (see Varian 1984).

In markets where suppliers face *perfect competition*, the equilibrium price will be the minimum a supplier is willing to accept, equal to the marginal cost of producing the product. Pricing above the marginal cost will drive a consumer from one supplier to another who offers a lower price. Under perfect competition, consumer surplus takes on its maximum possible value. The entire surplus accrues to consumers (given by the area under the demand curve but above the equilibrium price P0 in Figure 1). Thus, markets are most effective when perfect competition holds.

In contrast, markets are least effective under *perfect price discrimination*. If suppliers can assess their customer's reservation price and are able to segment markets, each customer could then face a different market price equal to the reservation price. By charging the maximum amount that each customer is willing to pay along the entire demand curve, suppliers extract total consumer surplus, thereby making markets least effective.

This perspective of markets describes the two extremes of a spectrum: perfect price discrimination, where suppliers extract the entire consumer surplus and markets are least effective; and perfect competition, where markets are most effective because the surplus in its entirety accrues to consumers.

Given the reality of opposing motives of suppliers and consumers, however, most markets fall between these two extremes. The conflicting forces at play will determine the eventual market structure. For example, commoditization enhances product substitutibility and lower search costs permit comparative shopping, which results in more effective markets. Conversely, information asymmetries between suppliers and customers and cost differentials between them for acquiring information about products and prices result in less effective markets. In the latter case, some of the consumer surplus will be expropriated from customers as suppliers set prices based on decisions made within the corporate hierarchy rather than as a conse-

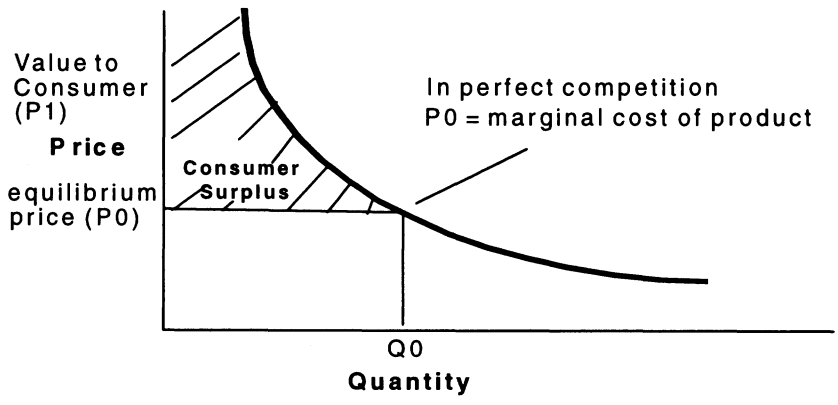

Figure 1. Demand Curve and Consumer Surplus

quence of market forces. This situation sustains itself when there are inhibitors to pure competition, which presupposes that buyers can costlessly search for alternative suppliers and compare product offerings.

Our premise of the market's effectiveness reflects this continuum where effective markets, which work in favor of the consumer, are contrasted with ineffective markets, which work in favor of the supplier. The remainder of this paper will draw upon these concepts, which relate market effectiveness to the distribution of consumer surplus in discussing the myths of the impact of information technology on market structures.

IT and Effective Markets

The worldwide web of computer networks and electronic information services allow a large, growing number of suppliers to interact with a large, growing number of buyers. Transaction revenue on the Internet is estimated at over $2 billion, and it is just beginning to enter a phase of rapid growth. Forrester Research, a Cambridge, Massachusetts, based research organization, forecasts annual online sales in 2000 will approach $7 billion. The U.S. telecommunications deregulation bill, the growth in multimedia services, the availability of intelligent search agents, and the investments in widening bandwidth are just some of the trends that bode well for electronic commerce.

Conventional thinking would suggest that these trends point us in the direction of greater competitiveness and more effective markets, where the free flow of information permits buyers to search competing sellers, thereby forcing the competitive equilibrium. Presumably, sellers are less able to sustain monopolistic positions. Four aspects of this argument that suggest movement toward price competition are:

1. **IT reduces transaction costs:** If IT reduces the buyers' costs associated with conducting marketplace transactions, namely, searching for suppliers, information seeking, and negotiating contracts, then comparative shopping is feasible and the supplier's ability to generate monopolistic rents is reduced. Conversely, if coordination costs are high, buyers may not incur the search costs to uncover competing suppliers, allowing suppliers to increase prices recognizing that buyers would rather pay the higher price than incur an expensive search. In this case, lowering prices will not increase the supplier's profitability because additional buyers would not be attracted due to restrictive search costs. Therefore, prices charged would be higher than those under pure competition, resulting in less effective markets. As these costs decrease through IT, these excess profits are eventually competed away (Bakos 1991a, 1991b; Gurbaxani and Whang 1991).

2. **IT reduces perceived complexity of products:** If IT allows buyers to search and compare complex products by providing information in a manner that is easy to interpret, the buyer perceives less complexity and can change suppliers based on this information. This results in more effective markets (Malone et al., 1987). In other words, information reduces uncertainty for the buyer regarding the value of complex products, thereby reducing the suppliers' ability to capitalize on this information asymmetry and generate higher rents.

3. **IT reduces asset specificity:** If IT allows products to be recast into alternative uses (i.e., reducing assets specificity) by changing some of their information attributes at minimal cost, then a broader range of consumers will receive more "customized" products (Malone et al. 1987). However, now consumers cannot be charged a premium for customization, because alternative suppliers could gather information and do the same customization at virtually no cost. In other words, customization becomes a commodity service that is subject to market forces, resulting in better value for the consumer and more effective markets (Bakos 1991b).

4. **IT increases free information flow.** If IT allows buyers to become more informed about suppliers in the marketplace and their product offerings, and suppliers can access information on the needs of buyers, the basis for generation of excess profits is reduced. It is

a well-known principle of economic theory that in competitive markets with efficient, free, and complete flow of information, sellers receive no excess return beyond the cost of capital employed (Varian 1984). The buyer and seller both understand the value of the product as perceived by the other party, thereby reducing opportunistic behavior. Simple microeconomic models of perfect competition assume that buyers can costlessly acquire information about prices resulting in a single market price. While unrealistic at one time, today's electronic markets are making this assumption increasingly realistic.

In summary, conventional wisdom and economic theory would suggest that IT reduces market imperfections and allows more players to compete in cyberspace, thereby resulting in more effective markets. While it may be premature to observe these effects in every industry, given that the gestation period might not yet be completed, anecdotal evidence exists of a growing number of Internet-based market mechanisms that have resulted in lower prices. Based on the arguments presented above, and support from a number of academic and industry observers, we can expect this trend to continue. Therefore, the core proposition that follows from these arguments can be stated as follows:

Increasing pervasiveness of information technology and information on ubiquitous global networks (the Internet) will continue to increase the effectiveness of markets.

We now turn to the counter-arguments. Interestingly, the enactment of such counter-arguments falls within the "feasible space" of the same microeconomic theory that allows us to make the case for effective markets. In framing these alternative views as "myths," we hopefully open up a more encompassing view of information and markets that recognizes the opposing motives of buyers and sellers and the potential impact of these motives on the nature of market structures that result.

The following six general tenets hold for all myths in the subsequent analysis:

1. The unit cost of IT-based processing, storage, and communication is becoming infinitesimally small, although not necessarily at the same rate for buyers and sellers.
2. Information, selectively applied, can represent two sides of the same coin, i.e., it can either clarify or distort perceptions. The latter is often not considered.
3. IT capitalization is asymmetrical among suppliers and individual consumers, thereby resulting in information asymmetry (which exists despite declines in IT costs). In general, supplier firms are still better capitalized than individual consumers, which means that we might be able to distinguish between the quality of information obtained by each party.
4. All parties work in their own respective self-interests, which may not be consistent with creating an effective market. In particular, suppliers might be more interested in using IT to sustain monopolistic positions.
5. Different consumers could value the same information differently. This creates a problem in allowing market forces to assess the "true" value of information.
6. The market structure evolves toward an equilibrium state rather than being one that is specified *a priori*. However, the market structure is a variable influenced by IT. These two parts of the tenet are intricately related. Specifically, the state of equilibrium is dynamic; and this dynamic is influenced by IT.

The key question is: *How do sellers survive in intensely competitive markets on IT networks with low coordination costs that seem to favor buyers?* Low costs make comparative shopping simple and force sellers to compete based on price. Sellers dread price competition, however, because the resulting equilibrium leads to their making small or zero profits. The trick for sellers to survive in such a "hostile" environment is to use the very resource that gave rise to their problems, namely, contemporary and powerful low-cost IT.

The myths below illustrate that it is altogether feasible for IT to enable supplier strategies that extract consumer surplus. For instance, suppliers could use IT to price discriminate by tailoring product offerings and charging buyers as much

as they are willing to pay. They could also segment markets making comparative shopping difficult, thus avoiding the competitive equilibrium. Also, suppliers could focus on the creation of networks that lock in customers or follow aggressive pricing strategies that deter price competition.

These supplier strategies are presented below in the form of myths and counter-myths. Note that: (1) while we devote more space to discussion of the non-conventional counter-myths, it reflects our desire to address their limited exposure in the literature rather than their imminence, and (2) the economic examples used are for illustrative purposes only, to express potential deviations from effective markets in tangible monetary terms.

Six Myths of Information and Markets

Myth # 1: Product customization, enabled by IT networks, would benefit buyers

Counter-myth #1: Product customization, enabled by IT networks, could allow sellers to exploit buyers

A General Perspective on Myth and Counter-myth #1

Arguments for the myth follow fairly conventional thinking. Many suppliers operating in networked environments attempt to capture information on buyers. Buyers often provide their information in the hope that they will benefit by getting a product tailored to their needs. ShopKo maintains such information in a 400 gigabyte data warehouse and makes this information available for potential target marketing via browsers on the Internet. Similarly, House of Seagram uses a database on 10 million adults who consume spirits to build brand loyalty as well as target consumers of rival products. It can be reasonably expected that in a highly competitive environment, this customization, if valuable to the customer and if based on information technology, can and will be replicated by a number of suppliers. This would keep the price of such a service down. We can observe this outcome on the Web where hundreds of financial service sites exist (e.g., Stockpoint) that allow any client to enter their personal stock portfolio, track it in real time, and use various options for organizing the data. Today, this service is often given away free. Buyers seem to be getting customized service for an extremely low price.

However, we propose there is an alternative perspective (counter-myth). Suppliers using powerful computers and comprehensive databases could exploit smaller and smaller market niches, by making inferences about an individual buyer's flexibility on product and price, propensity to shop around, etc. In doing so, they could inhibit competition and charge higher prices in these market niches.

An emerging tool to facilitate this exploitation is IBM's net. Mining solution, which uses sophisticated computer algorithms to transform site-visit information into detailed customer reports (McCune 1997). Netscape's cookie technology is remarkable in that it stores information on transactions and web pages visited by users on their own machines, providing an *integrated* profile of the customer for suppliers (Hagel and Rayport 1997). Companies like the Gartner Group and Lexis-Nexis can sell customized reports or information to different customers, even charging different prices to different customers if they can infer the customer's willingness to pay. Similarly, Kurzweil Applied Intelligence uses a versioning strategy by selling seven different versions of its voice recognition software, each with different features turned off and on and priced based on how different customers value the products (Shapiro and Varian 1998). With such superior information obtainable by suppliers, buyers may end up paying more for customized products that may cost virtually nothing to create. Buyers may be willing to pay more to forego the difficulty of shopping around for highly customized products. This is particularly true for individual consumers that rely on generic search engines and relatively low IT sophistication.

Growth in database marketing, relationship marketing, data warehousing, and data mining epit-

omize this trend. In fact, the Meta Group estimates that the data warehousing market grew as much as 40% in 1998 with 85% of manufacturers and retailers believing that they will have large integrated data analysis capabilities in place by the year 2000 (*Business Week* 1997).

An Economic Perspective on Myth and Counter-myth #1

Myth: The myth presumes that if sellers use IT to gather information on buyers, they can "narrowcast" or tailor offerings to different buyers or buyer segments. The customized product increases the buyer's reservation price. The low cost of entry into cyberspace, however, permits multiple suppliers to collect and process buyer information, to customize their offerings. Buyers can search out these alternative suppliers and choose the supplier that provides the best value/price tradeoff. Thus, while the reservation price increases, the competitive equilibrium holds, ensuring the increased consumer surplus accrues to the buyer. This market works in favor of the buyer and is therefore more effective.

Counter-myth: Interestingly, the enactment of an alternative scenario can also be examined through the economic lens. The above argument is sound, provided that the cost of information access for both the buyer and seller decreases proportionately. If so, the competitive equilibrium may be sustainable. The equilibrium may be unstable, however, because the slightest cost differential between buyers and sellers may be leveraged to a big advantage given that the costs of information gathering are minimal. Suppliers (i.e., firms) in general are in a better position to leverage information asymmetry, as they are larger and have economies of scale in gathering and analyzing buyer information. Buyers (i.e., individuals), on the other hand, must resort to public search engines and their own processing infrastructure to locate and compare suppliers.

Consider a supplier who collects information about customers over the Internet. The supplier would like to use this information to extract any consumer surplus. A self-interested customer is aware of this. The customer is nevertheless willing to divulge information with the promise of obtaining a customized product. The supplier in turn uses this information to make inferences about the customer's reservation price. By customizing products for customers with different reservation prices, the supplier can effectively extract surpluses along the entire demand curve, as long as the price exceeds the supplier's marginal cost. This target marketing reverses the traditional approach where suppliers divulge information about themselves (specifically, price and product information) and customers comparative shop to obtain the surplus. Competition in the market for customized products that presumably could shift the surplus from sellers to buyers is inhibited for two reasons: (1) sellers segment markets through product customization and (2) buyers are limited in their ability to assess price/value tradeoffs across market segments due to differential IT capitalization between buyers and sellers. In other words, while sellers with very low costs of customization could presumably compete, individual buyers face proportionately higher search costs, thereby reducing the incentive to search out alternative sellers. Thus, lower IT costs for sellers relative to buyers, even as both sets of costs approach zero, provide an effective means by which suppliers can expropriate surplus from customers.

A positive externality of the supplier's profit maximization objective is the increased market size. With information about customers, suppliers can broaden the market by providing a customized product to consumers, albeit at prices close to the maximum they are willing to pay.

Why is this market not to the benefit of the consumer? The customer gives up information expecting a return from the supplier in the form of better service or customization. While this outcome may indeed occur, the supplier is now in a better position to use the information to extract surplus from to charge every customer in every segment beyond that which was possible under perfect competition. This follows because of the seller's ability to segment markets through customization, thereby impeding competitive forces. The maximum amount that consumers will pay for customization corresponds to the limiting case of perfect price discrimination, where consumers are charged the maximum price they are willing to pay for a product, in which case all surplus accrues to the supplier. This is not an effective market because value derived from the efficient use of IT accrues to suppliers (see Figure 2).

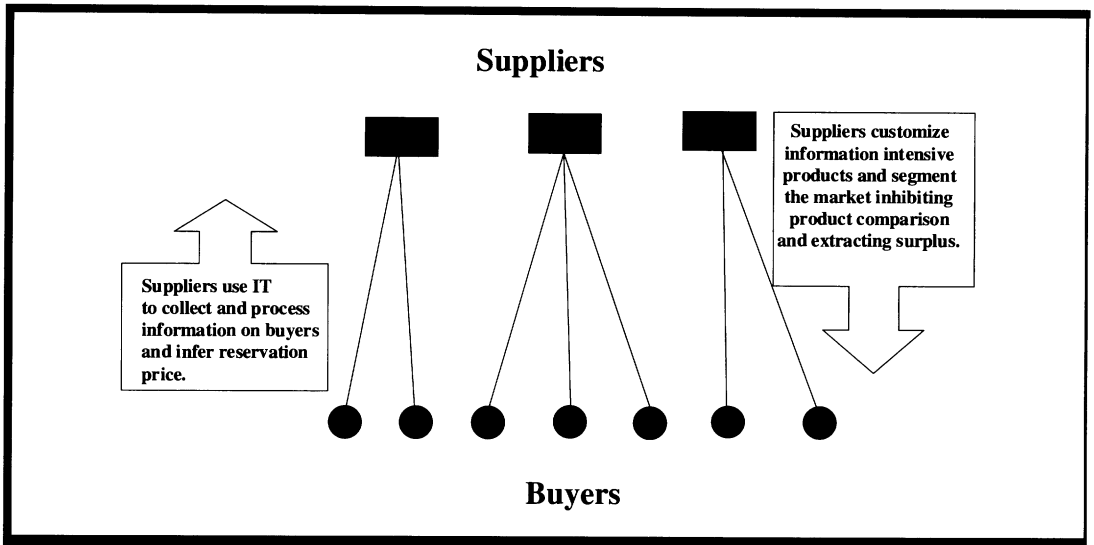

Figure 2. The Myth of Product Customization (Myth 1)

Economic Example

Consider the way Intuit versions its popular financial software product Quicken. If Intuit chose to market a single version of its product to the largest number of consumers, it may consider one with only the most popular features like tracking personal expenses, online bill payments, and links to financial websites. Less sophisticated consumers who wish to pay bills the traditional way, via mail, will be unwilling to pay for the online billing feature and therefore may forego purchasing the product. More sophisticated consumers who want complex and detailed investment advice, which the product does not offer, may also forego purchasing it. The problem with offering a single version of the product is that it fails to discriminate between customers. Offering multiple versions overcomes this problem and permits Intuit to price discriminate between consumers and extract surplus in the process as the following numerical example illustrates.

Suppose the optimal single version of the financial software product has five features and is priced at $10 per feature for a total of $50. And suppose it costs $8 per feature on average to produce the software for a total of $40. Thus a surplus of $2 per feature accrues to the supplier.

Potential customers are of two types: those who prefer more features whom we refer to as the "high" type, and those who prefer fewer features whom we refer to as the "low" type. We assume the high type is not only more affluent (i.e., able to pay more) but also has a higher reservation price (i.e., willing to pay more) and desire a more sophisticated product (i.e., with a larger number of features). Conversely, the low type is less affluent, has a lower reservation price, and prefers fewer features.

Suppose the high type's reservation price is $11 per feature with a desire for seven features. And suppose the low type's reservation price is $9 per feature with a preference for three features. The supplier has no knowledge of these reservation prices and customization preferences. Thus, the original product with five features was intended to strike a balance. The high type likes the price but not the customization; the low type likes neither. Thus, only the high type will potentially be attracted to the offer with probability less than 1.

Now suppose the supplier uses data mining software on the Internet to obtain information on consumers' income levels and personal preferences and infers the reservation prices and customization preferences of the two types. As a result, two versions are marketed: a base version with three features priced at $27 ($9 per feature) and an advanced version with seven features priced at $77 ($11 per feature). Indeed these prices are comparable to Intuit's base and top-

line versions of Quicken. Now both types will likely be drawn to Intuit's offerings.

Customization serves not only to identify those consumers with higher reservation prices from whom surpluses can be expropriated, but also facilitates market segmentation necessary to exploit the surpluses along the entire demand curve. This follows because the high and low types reveal their identities by the choices they make. Knowing that only the high type will choose the advanced version permits the supplier to extract the consumer surplus of $3 per feature from that customer. Correspondingly, the surplus of $1 per feature is obtained from the customer that chooses the base version. This persists because the two markets for the high and low types are segmented. Lack of features keeps the high type from choosing the base version, and the smaller reservation price keeps the low type from choosing the advanced version.

By offering two versions, not only does the market size increase, but the supplier is able to draw more of the surplus on a per-feature basis. The market size increases because both the high and low types are satisfied when previously neither was. The surplus on a per-feature basis that the supplier extracts is $2.40 ($3 per feature for the advanced version with seven features and $1 per feature for the base version with three features for a weighted average of $2.40 per feature, up from $2.00 per feature for the single-version case). Using buyer information, the supplier has successfully price-discriminated along the demand curve. While both customer types are satisfied and the market is expanded, surplus is moved away from consumers, rendering markets less effective.

Myth #2: Increased outsourcing, enabled by IT networks, would lower prices and benefit buyers

Counter-myth #2: Increased outsourcing, enabled by IT networks, could reinforce the seller's monopoly by sustaining higher prices

A General Perspective on Myth and Counter-myth #2

The myth is based on the argument that we would expect outsourcing, coordinated by IT networks, to reduce the supplier's production cost. These lower costs for suppliers should translate into lower prices for consumers if competition prevails. Thus, outsourcing product components to specialized manufacturers could potentially result in more effective markets. Conversely, failure to outsource may result in less effective markets. For example, if GM manufactured its own tires, we would likely have more expensive cars.

In discussing the counter-myth, however, we should recognize that complex products or specialized components that are outsourced are unlikely to be produced by a large number of suppliers. Thus, the market for outsourced products may indeed be less competitive as firms use a common supplier or set of suppliers. One example is Massachusetts General Hospital's use of "teleradiology" as a means to remotely access the diagnostic skills of medical experts. In essence, traditional radiology is reengineered into two parts: an in-house task of a radiology technician coupled with the remote service of a radiology expert. As hospitals increasingly compete (e.g., with HMOs), the remote service, which requires complex and specialized skills, are shared by multiple hospitals, reducing competitiveness along this dimension (Apte and Mason 1995). Similarly, UPS integrates its delivery service as part of product sales by its corporate clients, providing a single sale-and-delivery package. As competing corporate clients increasingly adopt similar arrangements with UPS, competition among these corporations with respect to the product component of the package persists, but competition with respect to shipping services is reduced giving UPS market power along this dimension (*Computerworld* 1997).

The noncompetitive impact of outsourced products is apparent in the computer industry as well. Computer assemblers like Dell compete aggressively on all components and services except Intel's chips, which hold a monopolistic power in the industry. While Intel decreases prices regularly for chips with aging technology, its cutting-edge chips command a premium suggesting market power. In fact, Intel's key strategy has been to commoditize complementary products like chipsets and motherboards to stimulate demand

for its core product, the microprocessor (Shapiro and Varian 1999). Yet another interesting example is the airline industry. What appears to be fierce competition among large numbers of online travel agents essentially boils down to competition among a few large airlines. Most of these airlines control the value chain and are making money at the cost of on-line agencies (Davis 1999).

We emphasize that increased outsourcing, enabled by information technology, could reinforce the seller's monopoly. The ability of monopolies to sustain higher prices is well known. The focus here is to illustrate the ability of IT to accentuate this effect. Monopolies with strong pricing power but low market penetration can be less profitable than monopolies with less pricing power but greater market penetration facilitated by IT. And while vertical integration can increase monopolistic power, the outcome could be less desirable if it comes as the expense of market penetration.

Summarizing, even though IT reduces coordination costs between firms giving rise to the potential benefits of outsourcing, the reduced costs could also make monopolistic supply chains and higher prices easier to sustain. This is particularly true in the case of complex and specialized components that are common among the products of competing firms.

An Economic Perspective on Myth and Counter-myth #2

Myth: Transaction Cost Economics is an important theoretical framework that has been used to study the decision to outsource. The firm's decision to outsource is usually thought to depend on the total cost of producing as opposed to procuring a given component. It is often true that the given component can be obtained at a lower cost from independent outside suppliers who enjoy economies of scale and scope in specialized production. However, the resulting market governance calls for locating and monitoring a reliable supplier, which could involve significant transaction costs. Alternatively, the firm could produce the component in-house through an organizational hierarchy, thereby saving on transaction costs but at the expense of higher production costs. IT can alter the balance of these tradeoffs by lowering transaction costs, thereby favoring markets (outsourcing) to hierarchies (Williamson 1975, 1979). As large global networks make outsourcing increasingly viable, market governance in lieu of hierarchical organizations will result in lower overall costs (Evans and Wurster 1997). With increased competition among suppliers, the benefit of lower costs will be passed on to the consumer.

Counter-myth: However, economic arguments offer another possibility. While it may be cost effective for firms to rely on forms of market governance for product components, a limit to the number of suppliers that the industry can sustain may exist. Each marginal supplier who enters the industry incurs an expense in real assets as well as in transactional relationships. Moreover, the increase in suppliers reduces the volume of transactions per relationship, thereby increasing the cost per transaction. As a result, successive suppliers contemplating entry into the industry face increasingly larger relationship hurdles. These hurdles are reduced to the extent that the industry expands and can therefore support additional suppliers.

In contrast, fewer relationships permit the firm and the supplier to invest in asset-specific resources, i.e., resources allocated to the relationship. Suppliers benefit in terms of being assured of a market for the components they provide. Firms benefit in terms of reduced monitoring costs. But fewer suppliers of a component reduce competition, which increases their ability to extract consumer surplus via the firm from the end customer. The surplus is then divided between the supplier and the firm according to their relative market powers, thereby making markets less effective. Suppliers will enter the industry only if the derived consumer surplus exceeds the hurdle to overcome relationship costs. This has been referred to as the "move-to-the-middle" hypotheses (Clemons 1993).

As IT costs approach zero, and outsourcing becomes prevalent, it is reasonable to expect that specialization would result in a core set of suppliers, particularly for complex idiosyncratic products. Within this core set, a single supplier could well exist for each component that the firm outsources. The firm would package the various

components into a product for sale to the customer. While several firms could be competing amongst themselves for the customer, this would exert no competitive force on the few individual suppliers to yield any consumer surplus that they could derive from the individual components they provide.

In summary, the core suppliers could derive supranormal rents from their monopolistic position on each component provided. Thus, as IT costs approach zero, the market governance (outsourcing) structure that results for complex idiosyncratic components permits suppliers to retain excessive consumer surplus, thereby making markets less effective.

As can be seen in Figure 3, the market structure is determined by the complexity of product components. This contrasts to the market structure in Figure 2, which is driven by customization.

Economic Example

Here it is interesting to consider the role of Intel in the computer hardware industry. If computer manufacturers such as Dell and Compaq, who compete intensely in the market for personal computers, were to develop their own microprocessor units, it would probably result in more expensive computers. Thus, the microprocessor, which is a complex and idiosyncratic component, is outsourced to Intel. While competition between Dell and Compaq has resulted in lower prices and lower margins for computers, Intel has sustained higher prices and margins for its microprocessors. And while consumers are pleased with the lower prices for computers, it is often overlooked that these prices could be lower still if not for Intel's market power as the following example illustrates.

The two computer manufacturers, labeled A and B, sell computers composed of two types of components: generic disk drives, memory, modems, and multimedia peripherals (labeled x), and the unique microprocessor (labeled y). Multiple manufacturers enjoy economies of scale for x because the components are simple. In contrast, y is complex and idiosyncratic and relationships cost are high, and therefore in equilibrium it is cost effective for only one supplier, labeled C, to produce this component.

Suppose the marginal costs of the components x and y are $900 and $100, respectively. Then the marginal cost of the computer, that firms A and B sell, is $1,000. At that price, surpluses accrue to consumers. Now suppose firms A and B as well as supplier C attempt to obtain some of the surplus by raising prices. Supplier C raises the price of component y to $600, to obtain a surplus of $500 (given its marginal cost of $100). Firms A and B price the computer at $2,000, also for a surplus of $500 (given their marginal costs are $1,500: $900 for x and $600 for y). The question arises: are these prices sustainable in equilibri-

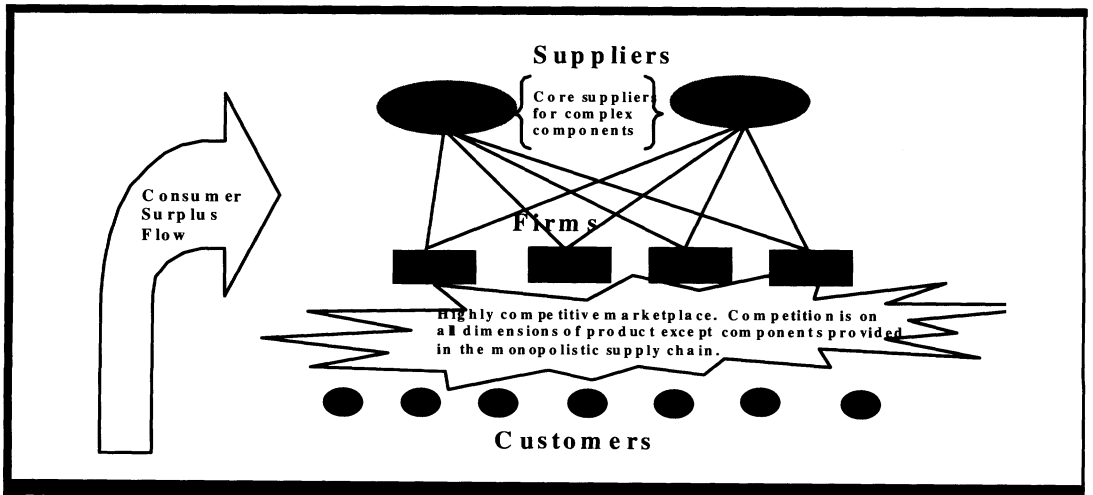

Figure 3. The Myth of Outsourcing (Myth 2)

um, and what economic forces are at play that will influence them?

Firms A and B will be unable to maintain the computer's price at $2,000 because of competitive forces. Price competition will force each firm to lower price successively until price equals marginal cost at $1,500, reducing their surpluses to zero. On the other hand, there are no competitive forces that will cause supplier C to reduce the price it charges firms A and B for component y, thereby keeping its surplus of $500. Neither A nor B can credibly pressure C to lower its price (say, by threatening to not produce the product composed of x and y) because if B withdrew from the market, its market share would be captured by A.

In this example, IT might keep transaction costs related to outsourcing down. However, the benefits that accrue to consumers are reduced owing to the surplus captured by the monopolist in the supply chain. This capture follows because component y is not competitive in the final product. By raising price, supplier C affects the cost structure of both firms A and B equally. Unless they have the latitude to absorb it into the cost structure of other components, both firms have to pass the cost down to the consumer. In other words, supplier C is absorbing consumer surplus from the end customers. Firms A and B, however, are competing on all other dimensions of the product except component y (where they have no differentiation). Ironically, casual observers of the end product see the market as highly competitive.

Myth #3: Open IT network architectures lower prices and benefit buyers as dependence on supplier hierarchies is reduced

Counter-myth #3: Open IT network architectures could be exploited by suppliers to create captive buyer networks that can sustain higher prices

A General Perspective on Myth and Counter-myth #3

The myth implies that as IT architectures become more open ala Internet and TCP/IP standards, companies have greater difficulty sustaining hierarchical positions with respect to their customers based on technology protocols and interfaces. This is unlike many widely reported strategic systems of the 1980s, where proprietary links (e.g., American Hospital Supply's ASAP System) were established (Johnston and Vitale 1988; Porter and Millar 1985) to increase switching costs for buyers and force dependence relationships. Open architectures make such dependence relationships difficult to sustain because a buyer can easily search and switch to an alternative supplier. We can therefore expect more comparison shopping by buyers ultimately forcing suppliers to lower prices.

However, the counter-myth is based on arguments contrary to conventional wisdom. As networks become IT intensive and both buyers and sellers gain better access to information, we can expect differential IT capitalization between buyers and sellers to tilt the balance of power. Larger suppliers are likely to be in a better position to package information products as well as information about products and services in a manner that makes it difficult for consumers to assess their value for comparative purposes. Difficulty in assessing tradeoffs between the product's price and the value it affords would inevitably impede competition. This is abundantly apparent on the Web, where suppliers have successfully created subnets or private access areas in which "special" consumers can obtain membership by paying a fee or providing personal information. Once membership is obtained, the subnet affords consumers certain privileges such as special product discounts and improved customer service. For instance, ESPN's Sports Zone allows members to obtain inside information and reports on their favorite teams that are not available outside the subnet. In fact, the consumer is part of a captive buyer network because there is a time, information, and possibly financial cost to exiting the subnet and registering for another one to compare products. Moreover, assessing the subnet's value prior to entry is often difficult.

Other examples include traditional businesses linking up to Internet Malls, which include a

collection of online storefronts, each offering different products, accessible through a single Internet site. Many products are a result of partnerships between firms. Consumers could be hard pressed to make price comparisons of individual products due to bundling across products and even companies within the mall site (Wreden 1997b). Similarly, Reuters bundles commodity style news items and data services to meet the specific needs of clients in ways that allow charging higher prices. News collection by Reuters from multiple sources is facilitated by low-cost and open IT network architectures. However, the products are bundled in ways that make it difficult to compare prices and features across comparative offerings by competitors. Thus, suppliers have effectively created captive buyer networks or hierarchies and can consequently charge higher prices.

An Economic Perspective on Myth and Counter-myth #3

Myth: With open standards and declining search costs, customers need not depend on a single source of supply. This is particularly true for information-intensive products and services, which can be delivered through information networks, as customers can easily search and acquire competitive products. It therefore becomes difficult for the supplier to generate monopolistic rents and extract consumer surplus based on a relationship involving switching costs.

Counter-myth: While it is true that companies would find it difficult to sustain hierarchies based on idiosyncratic protocols, higher IT capitalization could allow supplier firms to deliberately provide selective product information to targeted customers in ways that can inhibit product comparison. If product comparison is obscured, consumers have no frame of reference to assess the competitive price. They will tend to resort to their reservation price for making decisions. Information-intensive products in particular allow the ease of "bundling" components, making it difficult, if not impossible, for consumers to compare products and make choices based on price. Thus, firms avoid the competitive outcome.

One way firms can extract consumer surplus along the demand curve is by successively adding components (e.g., upgrades) to the base product and correspondingly increasing its price by amounts that exceed the marginal cost of add-ons. This strategy targets jointly those customers who have the resources to pay the higher price as well as those who have a higher reservation price. Both are necessary for suppliers to extract surplus successfully. Consumers with higher reservation prices are willing to pay proportionately more for the upgrades because the surpluses they derive from the base product are sufficient to offset the premium they pay for the extras. In this manner, suppliers can extract surplus based on the maximum price a customer is willing to pay rather than the minimum price a supplier is willing to accept. This is in contrast to the competitive outcome, where products are comparable and suppliers will lower prices (i.e., give away consumer surplus) to capture a larger consumer base. Here, consumers cannot compare individual products or prices directly because they are bundled, and they must assess price/value tradeoffs based on their reservation price.

As IT costs become arbitrarily small, firms are not limited to successive upgrades alone. Instead, bundles of every perceived combination of component products can be offered. Comparative shopping across bundles could then becomes impossible, and the reservation price is the only basis on which choices can be made. In short, information selectively applied can impede comparative shopping by consumers, and suppliers have a vested interest in using omniscient IT for this purpose. Indeed, some of the suppliers and bundles may altogether ignore consumers with smaller reservation prices in an effort to obtain the surplus from those who are willing to pay more. In contrast to Figure 4, traditional economic theory suggests that suppliers compete based on price, thereby promoting product comparison across suppliers. The outcome that results in which surpluses accrue to consumers is clearly undesirable to suppliers. Indeed, from the supplier's vantage, the use of IT to avoid the competitive outcome is key.

Economic Example

To see how open architectures can sustain captive networks, consider how information

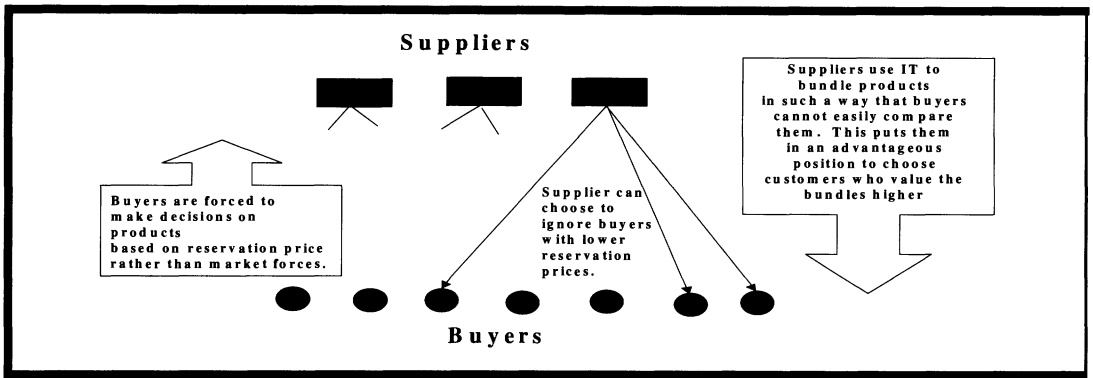

Figure 4. The Myth of Open Architectures (Myth 3)

services providers like Bloomberg and Zacks operate. Both service providers couple public information available on open architectures with proprietary information on their networks to create information products that customers value. For example, the public information corresponds to accounting data of publicly traded firms, and the proprietary information corresponds to the synthesis of analyst recommendations for stock performance. The two types of information are then combined in a convenient format and made available via the Web on a subscription basis ranging from several hundred to several thousand dollars per year. Other examples include Visual Numerics' use of the open-architecture Fortran and C++ programming languages together with its proprietary graphics and user interface software to create packaged products for programmers that command premium prices. The following example illustrates how these types of information may be combined to extract surplus from consumers.

Suppose there are two suppliers, labeled A and B, of information products and each supplier has a propriety component, labeled x and z, respectively. Supplier A's propriety information x can be thought of as Zacks' recommendation for stock performance, and supplier B's propriety information can be thought of as nonpublic information of security prices available on Blumberg's information-services network. Both these types of propriety information are potentially valuable to traders of financial securities. A third information component, labeled y, is available to both suppliers via open architectures. This common information includes the accounting data of publicly traded firms. Thus, supplier A can bundle components x and y, while supplier B can bundle components y and z. The bundled information products are then made available to two customers, labeled 1 and 2.

Assume consumer 1's reservation prices for the three components, x, y, and z, are \$5, \$5, and zero, respectively; and consumers 2's reservation prices are zero, \$5 and \$5, respectively. In other words, consumer 1 values Zacks' proprietary information and the common accounting data, and consumer 2 values Blumberg's proprietary information and the common accounting data. These reservation prices may represent the monthly subscription rates that customers are willing to pay for on-line access. Assume that the marginal cost to the information-service providers of each component is \$2.

Supplier A bundles x and y, while supplier B bundles y and z, the marginal cost of each bundle being \$4. Both products are priced at \$10. Due to the bundling, customers 1 and 2 will find it difficult to compare the products that suppliers A and B provide, thereby excluding comparative shopping based on price (see Table 1).

Under this scenario, customer 1 purchases from supplier A and customer 2 from supplier B because in each case market price does not exceed the reservation price. In contrast, 1 will not purchase from B and neither will 2 from A, because in these cases market prices exceed reservation prices. Each supplier obtains consumer surplus equal to \$6 (market price of \$10 less the marginal cost of \$4).

Table 1. Product Bundling Scenario

	Supplier A (Bundles x and y)		Supplier B (Bundles y and z)	
Customer	1	2	1	2
Reservation Prices	$10	$5	$5	$10
Market Price	$10		$10	
Marginal Cost	$4		$4	

For the competitive equilibrium to hold (at least for component y, which is generic), suppliers must have incentives to lower prices with the potential to increase sales and profits. However, neither supplier has an incentive to lower the price below $10 because neither can draw the other's customer until the price hits $5. If one supplier lowers the price to $5, while both customers would be attracted, the consumer surplus which that supplier is able to extract would be reduced from $6 to $2 (market price, $5, less the marginal cost, $4, times the number of customers, 2). Thus, price competition is futile to suppliers.

Unbundling the products proves fruitless to suppliers as well. Suppliers A and B can charge a maximum of $5 for components x and z (equal to the reservation prices), respectively, while the market price for component y is $2 (equal to marginal cost) given direct competition between A and B in that market. Thus, unbundling reduces each supplier's surplus from $6 to $3. It is evident from this example that suppliers can use the pricing power of the unique components (x and z) to extract from consumer's surplus on the generic component (y).

The competitive equilibrium is also inhibited in the individual markets that suppliers A and B create. This follows because low IT costs encourage proliferation of new markets (i.e., structuring of new bundles) rather than entry into old markets (i.e., competition with suppliers of existing bundles). The former permits extracting surplus from consumers. Conversely, consumers derive surplus in the latter.

It is apparent that the market is being segmented where supplier A captures customer 1 only and supplier B customer 2 only. Each supplier finds it unprofitable to capture the other supplier's customer. In turn, customers 1 and 2 are paying the maximum price they are willing to pay. In a competitive situation in the absence of bundling, at least component y would be comparable directly across suppliers, allowing consumers to make decisions based on price. Notice that it is not the uniqueness of component y but rather its bundling with components x and z that permits suppliers to extract surplus from consumers who have a high reservation price for an otherwise generic product. Thus highly networked environments can reduce market effectiveness.

Myth #4: Linking multiple market centers using IT networks would result in consolidated markets that benefit the buyer

Counter-myth #4: Linking multiple market centers using IT networks could result in fragmented markets that benefit the supplier

A General Perspective on Myth and Counter-myth #4

The unprecedented growth of today's information networks is allowing the interconnection of diverse markets. For instance, what were once proprietary networks like American Airline's SABRE or EDI industry platforms are now becoming a part of the integrated network milieu. The myth is based on the argument that integrating market centers of buyers and suppliers with IT links can increase the size of the overall market, thereby improving the choices and prices for customers.

The counter-myth however, implies that the IT connections themselves may not improve the nature of markets. Suppliers, driven by profit motives, may not be fully open in disclosing valuable information on the network when it may be used instead to gain strategic advantage. An example is the recently implemented linkages between the New York Stock Exchange and the Mexican Bolsa facilitated by American Depository Receipts (ADR) for cross-listed securities. Mexican firms are permitted to list their stocks on the NYSE. Since trading of these stocks occurs on both exchanges, there is information flow between the markets. The objectives are for the NYSE to generate trading commissions and for the Mexican Bolsa to become a more liquid market. While some improvement results from IT linkages, the markets remain fragmented in many respects as seen in trading cost and trading volume differences across the two trading centers (Domowitz et al. 1996). In short, IT linkages do not fully integrate the markets.

Similarly, the electronic integration of major security trading centers as mandated by Congress in 1975 has yet to be successful. Larger exchanges demonstrate unwillingness to fully reveal information in the expectation that they may profit from withholding it (Blume and Goldstein 1997; Grover et al. 1999). In the Fall of 1998, the Pacific Stock Exchange implemented an intranet-based trading system called Optimark that lets investors buy or sell in large volumes without telegraphing their moves to other traders, which helps keep the market from moving against the investors trading these large quantities. These examples illustrate that network linkages alone are not sufficient to render benefits to consumers if the supplier's incentive to profit from private information precludes making it freely available on the network.

While the previous examples pertain to securities markets, important inferences can be drawn for information and product markets. Until recently, the concept of consolidated markets applied mainly to securities exchanges for the following reasons: financial securities are standardized commodities and information sharing across financial markets was mandated by Congress and facilitated by electronic networks established by stock exchanges. With the advent of the Internet, the trading environment for information and products now more closely resembles the trading environment for financial securities. The question is, what have we learned from securities markets that will tell us how networks of product and information markets will evolve?

Despite the passage of congressional mandates for securities markets as far back as 1975, the impact of electronic linkages on the market's structure has only recently come to light. We believe a wait-and-see approach to the evolution of information markets on the Internet could prove costly since we believe it can significantly influence the balance of power between suppliers and consumers. Intuition suggests that on the Web, larger shopping sites (markets) could be reluctant to reveal full information because smaller sites could pre-empt their pricing. Therefore, despite the network linkages, the incentive to profit from information as opposed to freely revealing it may inhibit customers from getting all the benefits of integrated markets.

An Economic Perspective on Myth and Counter-myth #4

Myth: If multiple markets are linked through IT networks so that buyers and sellers at different trading locations can access product and price information across markets, then the broader market would be more effective, benefiting the consumer. This follows because (1) the increased size of the combined market and (2) the efficiency of information flows across trading centers would alleviate potential inefficiencies in the individual trading locales, permitting comparative shopping, thereby making it more difficult for suppliers to extract consumer surplus. In short, a broader base of buyers and a broader base of sellers would result in more effective markets.

Counter-myth: The above reasoning underestimates the self-motivated incentives of suppliers in the individual market centers. Suppliers wish to maximize the surplus they can obtain from consumers. They might do this by inhibiting valuable information flows from their market to the other. For example, obtaining information from other markets but not revealing information to those same markets creates the potential to generate larger profits (e.g., Madhavan 1995). If

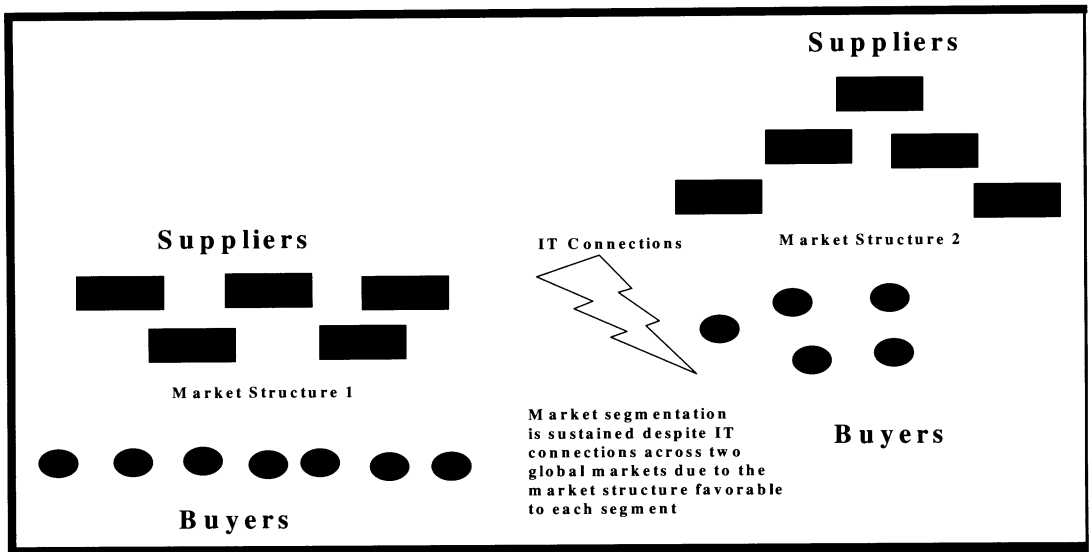

Figure 5. The Myth of Linking Markets (Myth 4)

suppliers in both markets pursue this strategy (and they have the incentive to do so), the markets would remain fragmented because trading information (e.g., price and quantity) in one market, though relevant, is unavailable to the other. Suppliers in the individual markets face reduced competition. Therefore, they are in a better position to expropriate surplus from their customers. In other words, these information-inhibition effects reinforce the conduct of business between sellers and buyers in their respective markets. If markets have no incentive to share information, the IT network provides little or no help in making markets more effective. Market effectiveness improves only through creation of the incentive to share information and/or change the structure of the two markets (see Figure 5).

Economic Example

For this case, it is useful to consider securities markets. We provide a numerical example illustrating how the incentive to collect but not divulge information can lead to market fragmentation, thereby creating the opportunity for suppliers to obtain surplus from consumers.

The effect of information sharing (or the lack thereof) across markets can be seen by examining the interaction of larger trading centers (e.g., the New York Stock Exchange) with the smaller regional exchanges (e.g., Cincinnati) (see Blume and Goldstein 1997). The Securities Act Amendment of 1975 has resulted in the implementation of IT linkages across these markets with the goal of sharing trading information (e.g., prices and quantities of securities traded) for the potential benefit of customers.

Consider two markets, A and B, connected by IT. (see Table 2).

The larger trading center, market A, benefits from economies of scale. Security dealers at

Table 2. Security Markets Scenario

	Market A (larger)	Market B (smaller)
Stock Value	$10 (Known to A)	Unknown to B
Ask and Bid Prices	$10 1/2 - $9 1/2	$10 1/2 - $9 1/2
Transaction Prices	$10 1/4 - $9 3/4	$10 1/2 - $9 1/2
Surplus Extracted	$0.25 per trade	$0.50 per trade

this location collect information about the stock's value ($10) when setting ask (price at which the dealer sells) and bid (price at which the dealer buys) quotes ($10 1/2 - $9 1/2). The network allows the smaller trading center, market B, to free ride on information collected in the larger market. While the stock's value is unknown to market B, it matches the quotes $10 1/2 - $9 1/2 using the available IT linkages. Of course, A expects B to free ride and therefore sets wide bid-ask spreads in an attempt to obscure information about the security's true value (Blume and Goldstein 1997). The wider spread makes it more difficult to ascertain the true value of the security and at the same time offers inferior trading terms to customers (i.e., higher ask price, lower bid price). In response, B draws customers from A by paying brokerage firms a small commission for directing orders to B and promising them prices as good as those posted in the larger market so that conflict of interest issues do not arise (Easley et al. 1996). But are customers getting the best price given the dealer's strategy in market A? Clearly, hiding information about the true value of the security benefits dealers in both markets but customers in neither. Thus, the unwillingness to share information because of self-motivated incentives results in fragmented markets. As a consequence, more surplus can be extracted from consumers, thereby making markets less effective. This outcome holds despite the presence of low cost IT linkages. Clearly, individual incentives must be addressed before markets can be more effective.

Myth #5: Expanding the customer base for a product using IT networks would result in greater benefits to buyers

Counter-Myth #5: Expanding the Customer Base for a Product Using IT Networks Could Allow Suppliers to Exploit Buyers

A General Perspective on Myth and Counter-myth #5

As the consumer base of products expands, the myth suggests that each consumer derives inherent benefits arising from the number of other consumers using the same product. For example, the benefit derived from using Microsoft's Office Suite is not just that it permits word processing and spreadsheet analysis, but that it also facilitates interaction between users of the same product. The size of the benefit depends on the number of users. The Internet allows software companies to quickly build a customer base by giving software away free of cost. The more consumers using the software, the greater their compatibility in exchanging information related to the software, and the more the related software support. For instance, Real Networks is building a large installed base for its streaming technology, with more than 26 million users as of July 1998, by distributing its software free over the Internet. With the size of this installed base increasing, video streaming on the Internet has become prevalent.

Another plausible consequence (counter-myth) of a large customer base, however, is the supplier's ability to leverage its market power by charging higher prices. For example, AOL aggressively builds its customer bases by enticing potential customers with offers of "free" hours, with the expectation of charging higher prices for products sold via its Internet site once customers are locked in. HP takes advantage of its installed base in inkjet printers by charging a premium for its cartridges (Games 1998). Microsoft leverages its existing customer base by marketing subscription-based software through the Web. Similarly, Windows '98 and MS Office'97 might well be priced higher simply because customers cannot switch easily to competing products for two reasons: the cost of learning to use an alternative product and forfeiture of the advantages associated with a network of customers. In fact, Microsoft's recent attempt to build a customer base for its browser software by bundling it with the operating system has been challenged by the Justice Department, which has recognized the market power associated with an installed customer base.

On the Web, McGraw-Hill Professional Book Group has its catalog of over 9,000 business and technical books on-line. It is receiving over 200,000 hits/month with a 30% annual growth in this number. Experimenting with a try-before-you-buy technology that allows readers to down-

load chapters/materials from books (based on IBM's Cryptolope technology for copyrighted material over the Internet) and exchange ideas, McGraw-Hill is successfully building a network of customers for its product (Wreden 1997b).

An Economic Perspective on Myth and Counter-myth #5

Myth: In the absence of market fragmentation (myth 4), a larger customer base for a specific product increases collective buying power. Moreover, low IT costs enhance customer access to this product. If a product has a broader market, it is more likely to be sold through a market structure rather than a relationship hierarchy. Further, more customers translates into intangible benefits for the consumer such as service and support infrastructure, informal information exchanges on the product, third party training, and greater confidence in vendor. All suggest accrual of surplus to consumers.

Counter-myth: As noted, the argument presented above can be framed in terms of network externality (Katz and Shapiro 1985). Simply stated, the utility that a consumer derives from a product depends on the number of other users that are in the same product network (Brynjolfsson and Kemerer 1996). IT facilitates network externality simply by enabling networks, particularly for products that are complex. Complex products require specialized service and service infrastructure, standardized features that enable wide usage, interconnection with other products and product modules, and other features that create the potential for a large customer base.

Companies often invest in establishing a network by standardizing a product and creating a large customer base for its use (e.g., by giving away free software). Such a strategy calls for early investments with no immediate payoffs. The benefit that consumers derive from being part of the network can be conceived as a source of consumer surplus. Moreover, the surplus increases with the network's size at little cost to the supplier. The key issue that arises is the division of this surplus between the consumer and supplier.

The division of the surplus is driven by two factors, market power and exit costs, both of which work to the supplier's advantage. Market power arises because the network inherently raises barriers to entry by competing suppliers. Exit costs arise for customers who wish to switch to a competing product and therefore incur loss of the product's use as well as loss of the accompanying externality. As a result, suppliers can charge a price above their marginal cost permitting the transfer of surplus from buyers to sellers.

Exit costs influence comparative shopping among alternative products. Suppose a customer using a software product contemplates not purchasing the upgrade in favor of a competing product. By switching from the current product to a competing one, the customer (1) saves an amount equal to the price of the upgrade; (2) loses the value of the corresponding network externality; (3) incurs search and start-up costs to benefit from the externality of the competing product; and (4) incurs the cost of purchasing the alternative product. Costs due to (2) and (3) represent hurdles to price-based comparative shopping between the two competing products. Unless the alternative product is lower in price by an amount that is sufficient to compensate for the hurdles imposed by (2) and (3), the buyer will not switch.

Suppliers can therefore hold the consumer base captive, charging a price well above marginal cost by an amount equal to the reservation price of the network externality. In doing so, suppliers can extract significant amounts of surplus from consumers. While it could be argued that this is a return on the investment for building network externalities, note that the amount of investment has no bearing on the amount of surplus that can be extracted. In the absence of competitive forces, the latter amount can be significantly larger than the former, in which case markets are less effective (see Figure 6).

Economic Example

Consider two suppliers, A and B, who market competing products but where only supplier A benefits from network externalities (see Table 3).

Suppliers face equal marginal costs of $10. Therefore, in a purely competitive market, the equilibrium price should be $10, with all surplus accruing to customers. However, supplier A builds a large customer base with product support infrastructure resulting in product confidence and user connectivity that customers value at $5, i.e., supplier A has established a

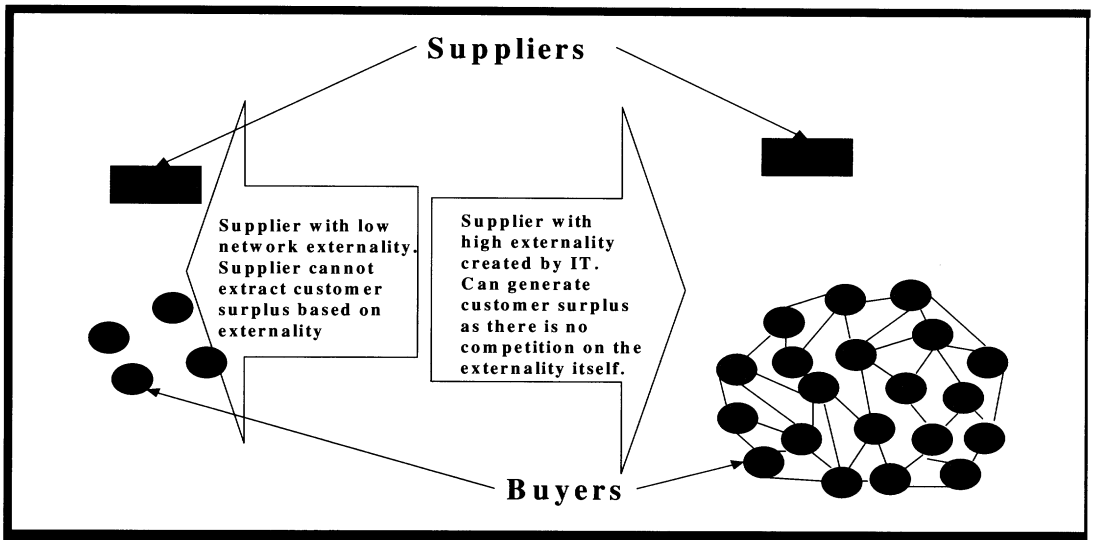

Figure 6. The Myth of Expanding Customer Base (Myth 5)

network externality worth $5 per customer. Of course, establishing this network is not without cost; the cost of financing this network is part of supplier A's marginal cost. Supplier A can charge as much as $15 (marginal cost plus network externality) without fear of losing customers to supplier B. Indeed, by charging $14, supplier A can run supplier B out of business because for the latter supplier to draw customers, he or she must lower price to $9, which is below the marginal cost.

Here, the $5 consumer surplus (i.e., the excess of market price above marginal cost) goes to supplier A! This outcome manifests price discrimination, where the supplier can charge the consumer what he is willing to pay and is indicative of an ineffective market. Notice that this result holds regardless of what supplier A may have invested in the network externality. In other words, there are not competitive forces that draw a relation between the cost of the externality and the consumer surplus that is derived.

Clearly, today's IT tools and distribution infrastructure make it easier to establish externality for products, particularly information-intensive and software-based products. The captive customer base that results allows suppliers to capture monopolistic rents, thereby making it more difficult for competitors to compete without the externality. The short-run implication for suppliers is clear. They should invest in building an externality to render the market ineffective.

Myth #6: A low-price guarantee by suppliers in environments enabled by IT networks would result in markets that benefit the buyer

Counter-myth #6: A low-price guarantee by suppliers in environments enabled by IT networks could result in price fixing and higher prices for the buyer

A General Perspective on Myth and Counter-myth #6

The myth follows conventional thinking and presumes that in networked environments like the Internet, customers can easily gather copious information across products and make informed choices on price and quality issues. Suppliers can nevertheless retain customers in this highly competitive environment by offering low-price guarantees, as is typical among physical stores like WalMart and Sears. In essence, the supplier offers to match the lowest price in the market that the customer is able to identify. Customers com-

Table 3. Network Externality Scenario

	Supplier A	Supplier B
Marginal Cost	$10	$10
Reservation Price of Network Externality	$5	0
Market Price	$15	$10

pare prices by suppliers of comparable products on the network. They then buy the product at the lowest offered price from that supplier offering the low-price guarantee. Clearly, the matching of prices by suppliers seems to encourage price competition to the benefit of customers.

Alternatively, the counter-myth is based on the realistic premise that highly networked environments also allow suppliers to track their competitors' prices. Such tracking could cause reluctance on the part of suppliers to lower prices. The reason is because lower prices may not have the intended effect of attracting additional customers if competitors are known to offer the low-price guarantee. Indeed, the supplier that lowers prices could even lose customers to other suppliers providing the guarantee. This could have the effect of price fixing, rather than competitive pricing.

One set of businesses that can collect competitors' price data is the airline industry. The Airline Tariff Publishing Company (ATPCO) sends information electronically about fare changes to its subscribers, which means that every airline gets a near realtime look at what its competitors are doing. Airlines are therefore in a position to guarantee low fares, being fully cognizant of their competitors' pricing information (Wreden 1997a). Similarly, NASDAQ is a network of computers where multiple security dealers can set bid and ask quotes on a specific stock. Each dealer's quotes are instantaneously available to all other dealers. Moreover, it is common practice for dealers to offer the low-price guarantee. Customers can go to any dealer or broker (who has an agreement with a dealer for the guarantee) and purchase the stock at the best price the market offers. In both the airline case as well as NASDAQ, the evidence suggests that this practice has increased rather than decreased prices (Huang and Stoll 1996).

An Economic Perspective on Myth and Counter-myth #6

Myth: If we assume that search costs approach zero with pervasive and powerful IT, then comparative shopping for simple products should force the competitive equilibrium. This is especially true if suppliers offer a "low price guarantee," i.e., offer to match the lowest price of any supplier in the industry. Consumers can then search easily for the lowest price in the industry and be assured of that price from their supplier. To attract customers, suppliers would have to compete vigorously based on price, moving price rapidly to equal marginal cost, which results in the competitive outcome where all surpluses accrue to the consumer.

Counter-myth: The above argument is intuitively appealing, and low price guarantees can influence consumer behavior. In highly networked environments, however, the negligible search costs might work as well, if not better, in favor of suppliers. We can assume in networked environments that customers and suppliers know the prices offered by all competing suppliers in the market. If the suppliers charge different prices, customers would migrate to the supplier with the lowest one. This creates the incentive for each supplier to lower price in an effort to attract customers. In this scenario, the competitive equilibrium holds.

However, if all suppliers offer the low-price guarantee, customers will be indifferent to where they shop. They can go to any supplier and get the lowest price in the market. Competing based on price becomes ineffective because no additional customers can be drawn to a supplier if that supplier lowers price (unlike the competitive environment). This situation holds because, in effect, all suppliers

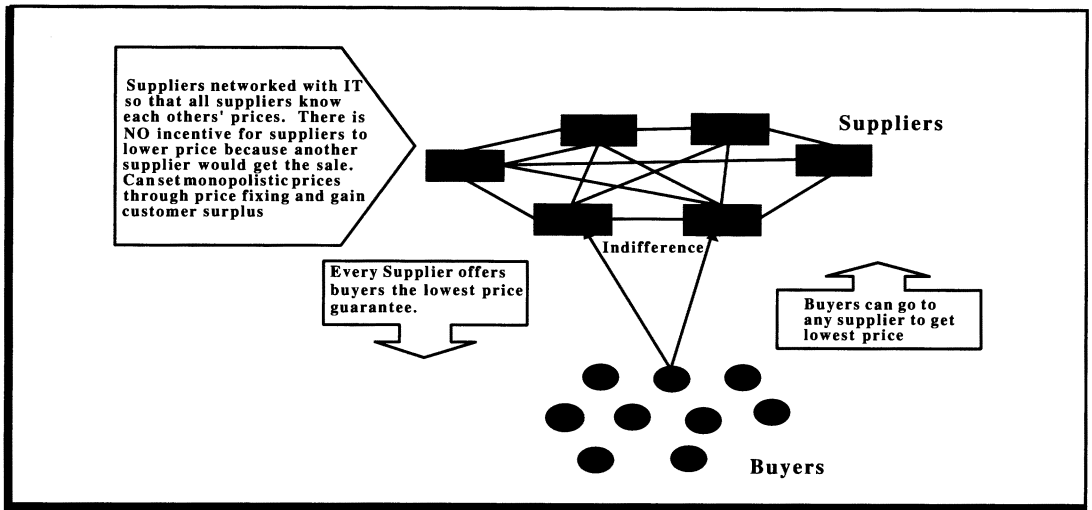

Figure 7. The Myth of Low-Price Guarantees (Myth 6)

lower their prices simultaneously. This simultaneous movement of prices can have a perverse impact on competition because it not only removes the incentive to lower prices, but it actually creates an incentive to raise them. For the same reason that no customers can be gained by lowering prices, raising them will not lose customers. Moreover, if the supplier with the lowest offer in the market raised his price, all suppliers would benefit as a result (see example below).

In effect, price matching enables price fixing, where the price at which trade occurs bears no relationship to costs. Lowering prices would yield no benefit, but it could invoke retribution from other suppliers because the price and identity of all suppliers is known, whereas raising prices would benefit suppliers (see Figure 7).

Economic Example

Assume three suppliers, A, B, and C, sell an identical product, which has a marginal cost of $1. Suppose they price the product at $7, $6, and $5, respectively. In a non-networked environment, they could sustain these prices and generate monopoly rents due to high search costs for the consumer. If they all offer a low-price guarantee, they could still obtain monopoly rents as it is costly for the consumer to search the lowest price.

Under highly networked environments, however, the consumer knows the price of each supplier, and suppliers know the prices of their competitors. Suppose initially that only B and C offer the low-price guarantee. There is no incentive for C to lower the price below his/her initial level of $5 because no additional customers can be drawn since B offers a low-price guarantee. In contrast, C has an incentive to raise his/her price to the level of $6 posted by B because doing so will increase per-unit profits without losing customers to B. In that case, both B and C will make large profits (trading with the same customer base at a higher price). Of course, no customer will trade with A at $7.

For A to attract customers, he/she must either lower price from $7 to $6 or offer the low-price guarantee. Suppose the latter is adopted. Both B and C will lose customers to A. While B and C cannot get these customers back by lowering price, they can nevertheless increase profits by raising price to the level of $7 posted by A (again, trading with the same customer base at a higher price).

This illustrates that with low price guarantees, suppliers have no incentive to lower prices. In contrast, they have an incentive to raise prices. Thus, consumer surplus is absorbed by the supplier, while consumers have the perception that they are getting the lowest price.

This myth is interesting because the implicit price fixing is difficult to identify by simply observing the market. Clearly, price matching impedes competition and renders markets less effective. Only after several in-depth comparative studies of the bid-ask spread on the NYSE vs. NASDAQ was the above problem revealed (see, e.g., Christie and Schultz 1994; Godek 1996).

Now, NASDAQ is revising its trading rules to permit individual investors (trading certain stocks only) to compete based on price with dealers via limit orders that are observable to the public (NASD Press Release 1995). In other words, while dealers may implicitly agree among themselves to fix prices by matching to the detriment of individual investors, these investors could avoid the inferior prices offered by dealers if they could trade among themselves directly. This direct trading is facilitated by investors submitting limit orders that are observable to other investors. In this environment, dealers cannot afford to offer inferior terms without the potential for losing customers who trade among themselves directly and therefore are forced to compete based on price. Thus, the ability of low-price guarantees to fix prices is reduced, although not eliminated.

Implications

The basic message of this paper is simple. We propose that with the pervasiveness of open architectures and electronic commerce, *both* consumers and suppliers can and will leverage IT to their advantage. While conventional wisdom tends to emphasize reduced coordination cost for consumers in the evolution toward market structures, suppliers can be equally aggressive in using the same IT to maintain monopolies. Unlike the strategic systems of the 1980s, these strategies need not be based on idiosyncratic protocols tying buyers to suppliers, but are possible in an environment of high and open connectivity. Therefore, this paper hopefully alerts academics and practitioners to the altogether feasible strategies that can be enacted by firms in the present and future. While we devote more space to the counter-myths enacted from the suppliers' vantagepoint rather than more conventional thinking, this does not reflect their inevitability. Rather, the equilibrium outcome in any market would be the result of a complex interplay between the vested interests of participants.

Forces Working in Favor of Suppliers

Implicit in our discussion of counter-myths are three factors motivating suppliers to enact these strategies:

1. **Increases in the set of feasible strategies:** While IT by itself is neutral, its ubiquity and flexibility allows suppliers to manipulate or withhold information in ways that increase the coordination costs of the usually less capitalized consumer. The possibility to manipulate information flow using IT dramatically increases the opportunity set of potential strategies that suppliers can adopt.

2. **Unique cost structure of information products:** Typical information products require significant up-front capital outlays for information gathering (or software development). The marginal cost of distribution or replication of these digital assets is (almost) zero. Under the scenario of intensive price competition, the competitive equilibrium based on traditional economic theory would yield price equal to marginal cost at zero. Clearly this outcome is very undesirable for suppliers. Therefore, they have every incentive to engage in strategies that prevent it from occurring.

3. **Difficulty in defining the long run:** It can be reasonably argued that supplier strategies, such as those described in this paper might not be sustainable in the long run, given market forces. For instance, any limit on information available to customers might create opportunities for intermediaries that work toward correcting it. The problem is defining the long run in a rapidly changing technological environment. We would contend that before the gestation period would end, suppliers could alter the environment sufficiently to resist the competitive equilibrium, and sustain positions of market power.

Therefore, as we have described, suppliers with their larger IT capitalization can process large amounts of data to engage in market segmenta-

tion, and discriminatory pricing. They can also use IT to confuse buyers. Rather than simplify complex information products, they can use versioning strategies or package them in a manner that precludes comparison. Also, supplier monopolistic positions in the value chain can be as easily automated and rendered more efficient using information technologies. Even when markets are connected using these technologies, suppliers can attempt to withhold information to keep the markets fragmented unless incentives are provided to share information openly and honestly. Suppliers can also build up network externality by giving early incentives to ensure adoption of their products. The installed customer base is then leveraged with upgrades and new versions. Even suppliers that offer low-price guarantees have no incentive to reduce price in a networked environment.

Forces Working in Favor of Buyers

It is important to note that there are powerful forces at play on the other side of the equation that would allow customers to retain much of the consumer surplus.

The "indisputable" conventional arguments: The inherent nature and evolution of IT facilitates the ability of consumers to search, compare, and buy. Better information for the consumer clearly increases their power. While suppliers can resist this by deploying the strategies we describe, much of their battle will be against the inherent nature of IT itself, which is changing in a direction of increasing openness.

Breakdown of assumptions: We based our counter-myths on the basic tenets of differential IT capitalization and information asymmetry between buyers and sellers. However, with open architectures, this gives rise to opportunities for new middlemen who can serve to bridge the information and IT gap. These "infomediaries" can serve as trusted custodians, brokers, and agents of consumer information by marketing it to businesses in return for favorable prices. By collectively bargaining on behalf of a number of consumers, these infomediaries can increase consumer bargaining power. Similarly, inexpensive software agents can shop for the best deal around on behalf of consumers.

Regulatory intervention: The role of regulators is primarily to ensure fair competition. Intervention will usually work in favor of the consumer as it reduces the probability of the counter-myths occurring in a dominant manner. As regulators begin to understand the implications of the new environment of electronic commerce, they can take action where they find evidence of false advertising, erroneous information, price discrimination, domination by one supplier, and price collusion.

While consumers may not have direct control over the monopolistic strategies of suppliers, awareness is a prerequisite to any concerted action. An informed consumer (with the time and inclination to be informed) is a powerful catalyst for market forces. Consumers need to continually question their costs of customization, be reluctant to give up personal information, attempt to segregate product bundles, be wary of "free" products, have a propensity to shop around, try to be alert to getting over-committed to a product, and carefully evaluate their cost/benefit tradeoffs in purchasing decisions.

So Who Will Win?

We don't know. However, it is our opinion that suppliers are not going to stand by as forces such as IT and infomediaries force them into intense price competition. The cost structure, particularly for digital products, would not allow them to survive. We would argue that suppliers would use every means possible to use the strategies described here to generate monopolistic rents. Even the proliferation of infomediaries, with the power of customer information behind them, would have to walk the tight line of generating advertising or transactional revenue from suppliers while maintaining bonds of trust with the consumer. In doing so, they would be loyal to the constituency that pays them and could in fact compound the network externality problem by reducing suppliers' costs of building a customer base. Similarly, infomediaries could reinforce the customization problem by allowing suppliers access to highly targeted information and allowing them to segment markets and price discriminate. Even the much touted customer software agents would be only as good as the information suppliers *choose* to provide to them.

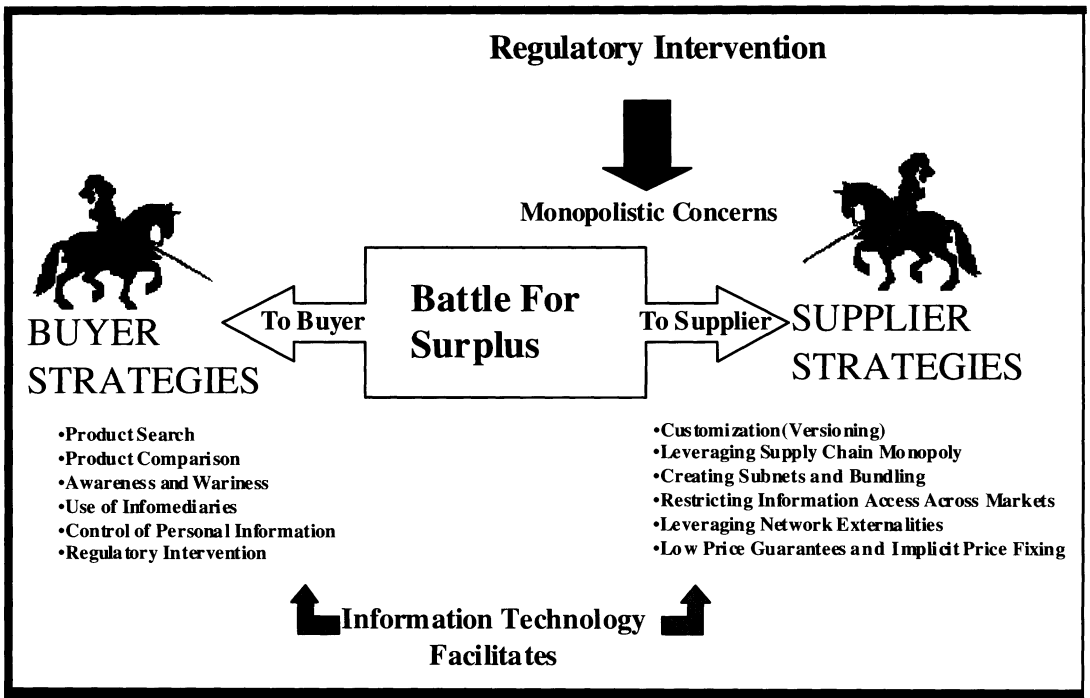

Figure 8. The Battle for Consumer Surplus

Of course, competition is the great equalizer. None of the strategies proposed would work if every product was commoditized and there was true competition. We would argue that markets in this new era require a delicate balance between buyers, suppliers, and regulators. Underneath the surface is a complex set of conflicting objectives and self-interested motives at work. Competitive advantage would be based not only on product characteristics and the ability to use IT and information to leverage the complementary assets of the firm, but also on the "information game playing" as we have described and believe will continue to occur.

Figure 8 provides an overview of the major players and their battle for consumer surplus. IT can facilitate both buyer and supplier strategies, while regulators observe the battle, monitor conditions for effective markets, and intervene if necessary. Table 4 summarizes the issues facing buyers, suppliers, and regulators in the marketplace with respect to each of the six myths.

Conclusion

Electronic commerce over large ubiquitous networks will soon be conducted in routine fashion. While some may question the timeframe involved, few will question its imminence. In this transient phase of rapid technological change, it is difficult to see the real implications of these changes for both business and society. Recent writings have elaborated on the power of information technologies to reduce the costs of coordination and transactions and consequently to influence governance structures between buyers and sellers. Much of the popular press is also fairly aggressive in providing anecdotes of innovative companies that have leveraged Web-based technologies by expanding, improving, or modifying product and service offerings. A subliminal theme in all this hyperbole is the notion that these technologies are good and will provide the consumer with many more options, services and advantages. This article challenges this theme by presenting alternative scenarios in which these technologies do not necessarily work in the best interest of the consumer.

Table 4. Summary of Central Issues

Myth	Central Issues for Consumers	Central Issues for Suppliers	Observation of Regulators: Conditions for Effective Market
Product customization, enabled by IT networks, would benefit buyers	• Am I paying too much for customization? • How does my price compare to other customers? • How can I compare product offerings from multiple suppliers? • Are there infomediaries who can work in my interest to help me do this?	• How can I capture information and profile my customers? • How can I determine their reservation price? • How should I repackage my products around their needs and charge them the reservation price? • How can I inhibit product comparison? • Are there other customers in the market that I can tailor my products to?	• If suppliers act in the interest of customers. • If buyers have IT tools that allow them to detect price discrimination. • If infomediaries exist that work in favor of the buyer. • If buyers and sellers do not have asymmetry in IT capitalization.
Increased outsourcing, enabled by IT networks, would lower prices and benefit buyers	• Is there a monopolistic position in the supply chain? • Is there a component of the product that is similar across competitive products? • Am I being charged too much for that component? • Is there really competition at the consumer level or does it just appear that way?	• How do I extend my monopolistic position by bundling my product through a number of distribution channels? • Can I raise prices in a way that is invisible to end buyers? • How can I sustain the complexity of the product so that I can capitalize on all outsourcing arrangements?	• If suppliers act in the interest of customers. • If complex products do not exist in the supply chain. • If IT allows buyers to price individual components easily. • If IT facilitates consumerism where buyers recognize the monopolistic power in the supply chain and pressure the monopolistic supplier.

Table 4. Continued

Myth	Central Issues for Consumers	Central Issues for Suppliers	Observation of Regulators: Conditions for Effective Market
Open IT network architectures lower prices and benefit buyers as dependence on supplier hierarchies is reduced	• Can I compare product offerings from different suppliers? • Am I paying too much for a product bundle with products that I do not need? • Am I migrating to this supplier because there is no similar offering? • Do I know what I am getting before I pay a fee for the subnet? • Is there an unbiased infomediary that can help?	• How can I bundle my product in such a way that it is difficult for buyers to compare products? • How can I limit price shopping by not directly revealing product price? • How can I add new product bundles that are different from my competitors'? • How can I create subnets and tempt them to enter the subnet for a fee, without revealing all information about the product?	• If suppliers act in the interest of customers. • If IT allows buyers to unbundle products and compare prices. • If buyers and sellers do not have asymmetry in IT capitalization. • If infomediaries exist that work in favor of the buyer.
Linking multiple market centers using IT networks would result in consolidated markets that benefit the buyer	• Why is there a tendency for me, based on my trade, to go to one market and not the other? • How can I obtain information about the same product in *both* markets? • Why do I have to adhere to different sets of trading procedures for each market?	• How can I retain my customer base by limiting information flow across market centers? • How can I leverage trading rules in my market so that I can limit ease of trading across markets?	• If suppliers act in the interest of customers. • If market structures and trading rules are changed to facilitate cross trading. • If markets are provided incentives to share information.

Table 4. Continued

Myth	Central Issues for Consumers	Central Issues for Suppliers	Observation of Regulators: Conditions for Effective Market
Expanding the customer base for a product using IT networks would result in greater benefits to buyers	• How much am I paying for an established product—even though it is not the best? • Is the product really "free" or am I getting locked into something I can't get out of?	• Can I provide incentives to build a larger base of customers that I can leverage at a later time? • Can I leverage my customer base by continuously providing upgrades or complementary products? • Can I encourage customer support structures that add value which can be leveraged for profit? • Can I run competitors out of business by undercutting them, given my large customer base?	• If suppliers act in the interest of customers. • If customers using IT or otherwise lobby against the externality of an overpriced product. • If multiple suppliers with competing products establish their customer base at the same time. • If domination of one supplier requires antitrust legislation to force competition.
A low-price guarantee by suppliers, in environments enabled by IT networks, would result in markets that benefit the buyer	• Is there a price difference among multiple suppliers or are all the prices the same? • Are the suppliers tracking the lowest prices in the market? • Is there a way to track changes in prices among multiple suppliers?	• How can I closely track prices of my competitors and provide a low price guarantee? • Can I raise prices in conjunction with my competitors without losing customers? • How do I inhibit customers from tracking my prices and those of my competitors?	• If suppliers act in the interest of customers. • If customers or their agents (infomediaries) use IT to track changes in all supplier prices. • If suppliers do not access information on their competitors and customers do. • If buyers and sellers do not have asymmetry in IT capitalization. • If collusion or price fixing in not evident—requiring antitrust legislation to force competition.

In conclusion we would like to reiterate that the objective of this article is to challenge and expand existing thinking about the efficacy of information networks. The economic examples presented are intended to provide a tangible and reasonable face to rational counter-arguments. The myths presented are not illustrative of companies doing anything wrong or illegal. Instead they merely provide a broader context for the interpretation of information and markets. Whether these "myths" can be offset in the long run by the very nuances of the technology that created them remains to be seen.

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