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VALUE CREATION, PRICING AND THE INTERNET

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- 2) Develop a conceptual framework that will help enable the world of business to understand and control the impact of the Internet and e-business.
- 3) Diffuse the knowledge generated by research in this field through the usual scientific and professional media.
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These goals will be achieved through three activities: research, training, and communication. The Center’s efforts will be focused primarily on research, as the foundation for training and communication of the results obtained.

## VALUE CREATION, PRICING AND THE INTERNET

### **Abstract:**

In this article we argue that the effect of the Internet on business strategy cannot be reduced to a simple statement about the price level “before” and “after” its arrival. To understand the impact of the Internet we need to analyze both the effect on value creation and the effect on value appropriation. We argue that, with respect to value creation, the Internet, on the one hand, reduces production and transaction costs. On the other hand, by reducing search costs and enabling greater customization, it increases customers’ willingness to pay. Overall, we would expect the Internet to have led to more value creation. However, the Internet has also affected the value appropriation opportunities in the market. Therefore, it is not surprising that the evidence on pricing and the Internet should be so inconclusive, suggesting that while average prices may be lower, price dispersion has increased considerably. These effects can only be understood through a thorough analysis of the value creation and value appropriation potential since the arrival of the Internet, which has led to a significant transformation of many industries.

**Key Words:** Value Creation, Value Appropriation, Pricing, Internet.

## VALUE CREATION, PRICING AND THE INTERNET\*

### 1. Introduction

The Internet has had a profound effect on the value creation system in many industries. First, it has allowed greater efficiency, reducing the opportunity cost of providing the same products and services. Second, it has allowed firms to improve their offerings to their customers. Firms can use the information obtained through interacting with their customers to tailor the offer (product, service, information) to customers' preferences. This increases these customers' willingness to pay. Thus, the Internet has increased the value creation potential of most value systems by either reducing the cost of providing goods and services, or increasing the willingness to pay for more appropriate goods and services.

Creating value on its own is not sufficient to sustain a competitive advantage over time. A profit-oriented organization will want to appropriate part of the added value created through its investment in the Internet. A firm's value appropriation potential depends on four critical factors: the rivalry in the industry, the entry barriers to the industry, the bargaining power of suppliers, and the bargaining power of customers. At first glance the Internet has increased rivalry by increasing the transparency of many markets and lowering entry barriers. Furthermore, customers are more knowledgeable, which has increased their bargaining power. As a result, the value appropriated by firms has come under severe pressure. Nevertheless, a third and final effect of the arrival of the Internet on the value creation system has been precisely the possibility of appropriating value. While traditional positions and capabilities have lost their value appropriation capacity, the Internet has made new organizational forms and new pricing schemes feasible. Without a rethinking of their positioning and pricing it is unlikely that firms will be able to capture any of the additional value created by the Internet. The impact of Internet technologies has advantages for firms that go beyond the configuration of the traditional value chain, resulting from new combinations of information, products and services, including the reconfiguration of resources and processes (Amit and Zott 2001).

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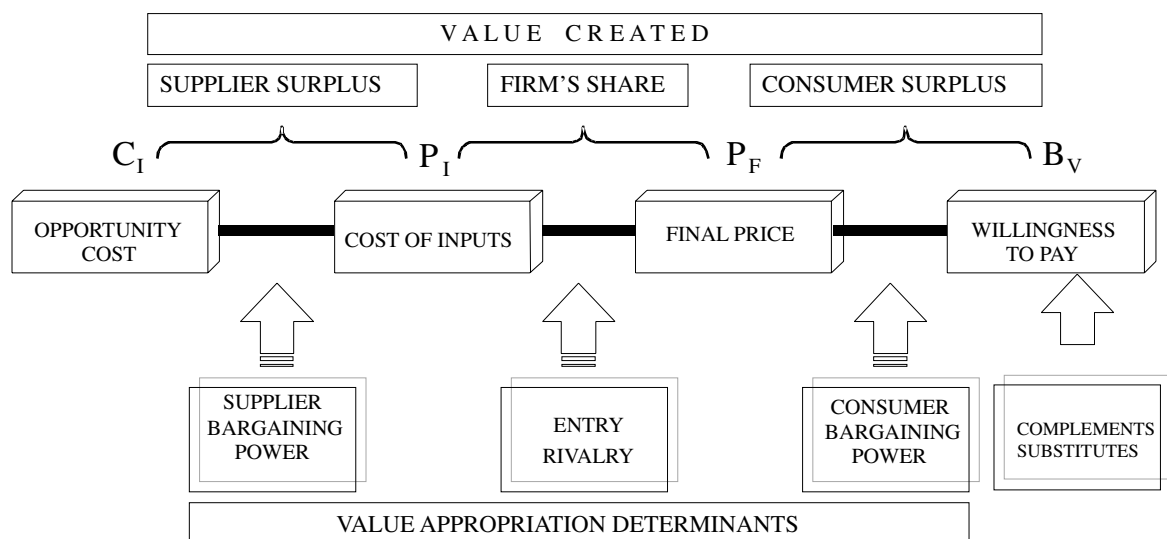
## 2. Value Creation and the Internet

The information technology revolution has been gradually changing business models and industry structure, redefining the sources of competitive advantage, creating new business relationships, and expanding the scope of the industries in which firms must compete to achieve those advantages (Porter and Millar, 1985). This process has been intensified recently with the use of the Internet as a new channel for business transactions. Traditional firms are using electronic markets as a channel for consolidating businesses and creating value. In addition, a new type of firm that operates primarily on the Internet has appeared.

The Internet affects conventional competitive strategies in at least three different ways: 1) the greater efficiency generated by lower transaction costs reduces the firm's cost structure; 2) the reduction of consumers' search costs and new opportunities for product differentiation affect consumers' willingness to pay; and 3) electronic markets allow new organizational forms and pricing mechanisms. These effects can be better understood by first elaborating the more traditional value creation system (Porter 1985).

Value is created through the interaction of a firm with its suppliers and buyers. Dell, for example, buys supplies from component manufacturers, hires workers and accesses capital through the stock market. These inputs are transformed into a PC, which is sold to a Dell customer. In the process value is created whenever the PC user's willingness to pay exceeds the opportunity cost of the resources used to provide this offering. Figure 1 shows the main elements involved in the value creation process and the determinants of value appropriation. Clearly, the key factor in value appropriation is the pricing mechanism. If suppliers have sufficient bargaining power, they are able to charge the firm prices that exceed their opportunity cost. Similarly, consumers with sufficient bargaining power are able to capture some of the value created by driving the prices they pay below their willingness to pay. The firm's margin thus depends on how successful it is at setting prices close to its customers' willingness to pay and at paying suppliers close to their reservation value, i.e. their opportunity cost.

Figure (1) Value Creation and Value Appropriation Framework



The total value created is divided between the different parties involved in the value creation process: suppliers, the firm and consumers. We have simplified the value creation system to three stages for ease of exposition, but it is obvious that most value systems will have many more intermediate stages. The difference between the cost of acquiring inputs from suppliers ( $P_I$ ) and the opportunity cost of these inputs ( $C_I$ ) represents the supplier surplus ( $P_I - C_I$ ). The difference between the cost of inputs and the price charged to consumers ( $P_F - P_I$ ) is the margin that the firm captures. Depending on product characteristics, differentiation from substitutes and other services and the availability of complements, consumers have a perceived benefit from buying certain products, i.e. willingness to pay ( $B_V$ ). The difference between the buyer's willingness to pay and the price at which the firm sells the product ( $P_F$ ) determines the consumer surplus ( $B_V - P_F$ ). Therefore,

$$\begin{aligned}
 \text{Total Value Created} &= B_V - C_I \\
 &= (B_V - P_F) + (P_F - P_I) + (P_I - C_I) \\
 &= \text{Value Appropriated Consumer} \\
 &\quad + \text{Value Appropriated Firm} \\
 &\quad + \text{Value Appropriated Supplier}
 \end{aligned}$$

Consider, for example, a worker and a firm. Suppose that human capital is the only input necessary for the firm to produce output and that one unit of labor input generates one unit of output. The worker, in this case, is a supplier of human capital to the firm and the opportunity cost of working for the firm is determined by the wage he could earn from alternative employment opportunities but gives up in order to work for the firm. So, if the worker's opportunity cost is, say, €20 per hour and he is able to bargain with the firm to obtain a wage of €25, then he appropriates €5 of the value created and obtains a surplus of €5. Similarly, the bargaining interaction between the firm and its customers determines how much value each party appropriates. Suppose that the buyer is willing to pay €100, but is able to bargain the price down to €80. In this case the buyer appropriates €20 of the value created. The total value created is the difference between €100, the buyer's willingness to pay, and €20, the opportunity cost of supplying the good or service, or €80. This value is split between the supplier (€5), the firm (€55) and the buyer (€20). In many situations the buyers and suppliers will not bargain with the firm on an individual basis, but in making its pricing decisions the firm will need to take into account the alternatives available to both buyers and suppliers. As we will discuss in a later section, depending on the institutions, different types of pricing mechanisms exist both in relation to the suppliers and in relation to the buyers. The next sections follow the structure of the value creation model. First, we discuss the effect of the Internet on value creation on the supply side. After that we turn to its effect on the demand side. The remaining sections will tackle the theory and evidence on value appropriation and the Internet.

## ***2.1 Value Creation and the Supply Side***

The Internet has introduced new efficiencies into the supply channel, opening up possibilities of value creation deriving mainly from cost reductions and consolidation of the supply chain (1). We shall consider three sources of efficiencies on the supply side due to

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(1) The effect of the information revolution on firms can be observed on both assets and cost structure. In recent years the importance of intangible assets as opposed to traditional physical assets such as buildings, factories and machines has been growing. Intangible assets are considerably more difficult to measure and include patents, know-how, brand names and human capital. Robert Hall (2000) calls this type of capital "e-capital" and measures it as the difference between the excess of market value over the value of plant and equipment (see also Hall, 2001).

the emergence of the Internet. First, firms are able to organize their existing business more efficiently by better coordinating activities within the value system. Second, firms will reorganize their activities because of the potential of organizing electronic markets rather than performing activities internally. Finally, because of changes in operations, dis-intermediation and re-intermediation opportunities affect the way business is conducted.

### 2.1.1 Production and Transaction Costs

In the firm's cost structure we distinguish between production and transaction costs. The impact of this changing environment on a firm's production costs will depend on the type of business and industry characteristics. However, in general, we expect that variable operating costs should be lower for Dot.coms than for traditional firms, although investments in technological infrastructure, systems development and maintenance costs, plus brand development and marketing expenditures, are relatively higher than in other comparable businesses and involve a huge upfront outlay. Therefore, production costs will be affected by reductions in variable costs and potential increments in fixed costs due to investments in technology platforms and maintenance (Porter 2001). Variable cost reductions will be particularly noticeable in the purchase price of raw materials and services, purchasing cycles, administrative costs and inventory costs. Table 1 illustrates the effect of Internet procurement on variable costs.

**Table 1. Variable Cost Reductions**

	<b>Traditional Markets</b>	<b>Internet Procurement</b>
Price of Materials and Services	- -	5%-10% reduction
Purchase and Fulfillment Cycles	7.3 days	2 days
Administration Costs	\$107 per order requisition	\$30 per order requisition
Inventory	- -	25% to 50% reduction in inventory costs

Source: Aberdeen Group, June 1999 (<http://www.aberdeen.com/>)

Transaction costs can be defined as the underlying costs of transacting among firms and suppliers that affect cost and organizational structures. Oliver Williamson (1975) in his book *Markets and Hierarchies* argues that firms exist to reduce the costs of monitoring and conducting transactions that are necessary to trade goods and services in markets. Williamson differentiates between *markets* and *hierarchies* in terms of location of value creation. When the value is created "in-house", the term hierarchy is used; otherwise, the value can be added by procuring goods and services in the *market*, following the law of demand and supply. Transaction cost theory identifies transactional efficiencies as the greatest source of value creation. Factors such as reputation, transactional experience and trust may lower the cost of idiosyncratic exchanges (Williamson, 1985).

Within transaction costs Milgrom and Roberts (1992) distinguish between costs of *coordinating* and costs of *motivating* the value system. Costs associated with coordination include the determination of prices, allocation of resources and location of buyers and sellers to conduct transactions. Motivation costs include the costs generated by information asymmetries and imperfect commitment. When buyers and sellers agree to exchange goods or services, buyers have private information about their willingness to pay and sellers about their opportunity costs. This creates information asymmetries that increase the cost of transacting. Furthermore, the fact that partners to a deal can only imperfectly commit to provide the necessary investments for a project results in opportunities for hold-up, affecting the initial investments in the project.

Firms such as Dell Computer and Cisco Systems have shown an impressive growth in value since they made the Internet a key element of their business architecture. The role of the Internet in this process has been crucial for introducing new efficiencies and market transparency in the value system across all the value-added activities, allowing a deeper integration of the value chains of different organizations belonging to the value system. These efficiencies come mainly from the reduction in transaction costs, making both markets and hierarchies more efficient but at the same time shifting the economic organization from hierarchies to markets (Malone et al., 1987).

### 2.1.2 Markets versus Hierarchies

The arrival of the Internet not only has affected the transaction costs of existing activities, but also has introduced a new way to interpret supplier-firm relationships known as Business-to-Business (B2B) e-commerce. B2B e-commerce or e-procurement refers to the traditional activities of procuring materials and services, using electronic marketplaces. According to the US Department of Commerce, 90% of all e-commerce conducted in 1999 involved online business-to-business deals (2). Additionally, a study by Gartner found that B2B e-commerce revenues reached US\$433 billion in 2000, a 189% increase over the \$145 billion in revenues raked in by B2B e-commerce in 1999 (3). An electronic marketplace or electronic market “is an interorganizational information system that allows the participating buyers and sellers to exchange information related to prices and product characteristics” (Bakos, 1991, p. 296). Under a hierarchical interaction, value chain activities are governed by managerial control, procuring production inputs through established suppliers. Through this organization the cost of searching for other suppliers, writing contracts, etc. are reduced. However, if value system activities are guided through open market relationships, the firm will obtain better deals and more competitive prices. With the emergence of electronic markets, transaction costs have been reduced and hierarchical relationships are becoming less efficient compared to market relationships.

The initial expectation regarding the profit potential of organizing B2B marketplaces spurred the proliferation of many new intermediaries, leading to a significant overcapacity (4 and 5). *The Economist* estimated that over 750 networked marketplaces have been developed worldwide (6). Some of these new marketplaces cover a wide variety of products and an extensive group of buyers and sellers. Many independents, such as Zethus (commercial real estate), Chemdex (chemicals) and Optimark (equities), have closed. Others have been more successful in exploiting the opportunities of the business model. For example, FreeMarkets Inc., a US-based company, holds B2B online auctions, providing e-commerce technology and services to buyers of industrial parts, raw materials, commodities and services (7). The company receives orders from companies and calls on suppliers to bid for the contract. One of its clients, United Technologies Corp., used to buy circuit boards from eight different suppliers in the US and Europe, expecting to pay about US\$ 74 million. Through electronic auctions hosted by FreeMarkets, about 29 suppliers posted bids, dropping the price 43% (8). By adopting this business model companies have saved more than 15% on average for buying goods and services. In Europe, FreeMarkets has conducted B2B auctions that sold some \$340 million worth, about 15% of its total sales (9).

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(2) <http://www.esa.doc.gov/de2k2.htm>

(3) *E-Commerce Times* (06/22/2001), “The Biggest Myths About B2B”, by Lori Enos.

(4) Merrill Lynch estimates that total worldwide B2B e-commerce sales in 2003 will be \$2.5 trillion, with earnings of about \$25 billion a year.

(5) The number of online exchanges increased from 50 in 1998 to 600 by the year 2000 (*Business 2.0 Magazine*, June 2000).

(6) *The Economist* (03/04/2000), “Seller Beware”, pp. 61-62.

(7) *FreeMarkets Annual Report 2000*.

(8) *Fortune Magazine* (20/03/00), “Going, Going, Gone: The B2B Tool That Really is Changing the World”, by Shawn Tully.

(9) *Business Week* (04/07/2000).



Understanding where these huge savings in the supply channel come from requires dissecting the firm's cost structure.

The Internet affects some cost drivers more than others. Transaction costs and input prices are the cost drivers on which the information technology revolution has probably had the greatest impact. The reduction of transaction costs –in particular, coordination costs through the use of B2B marketplaces– is the main source of these enormous savings. Garicano and Kaplan (2000) study the changes in transaction costs resulting from the introduction of electronic markets for the auctioning of used cars. The authors calculate the potential cost reductions in transaction and production costs for an online auction company (10). The results show a reduction of approximately 52% between physical auctions and the online process. Another of the cost drivers affected is the prices of inputs. Now firms can obtain substantial savings from procuring raw materials and services from electronic marketplaces. These reduced input prices can be the result of reduced transaction costs, but also of the change in bargaining power between the firm and its suppliers as a result of electronic markets. We will revisit this issue in the section on value appropriation.

### *2.1.3 Dis-intermediation and re-intermediation*

The impact of electronic marketplaces on the value system has also triggered a process whereby some of the traditional intermediaries are becoming obsolete and new virtual intermediaries are being incorporated. Transaction costs are assumed either by buyers, or by sellers, or by a third party to the transaction who intermediates between buyers and sellers. Intermediaries play an important role in price setting, as they purchase from suppliers and resell to buyers. The intermediary solves the asymmetry of information between suppliers and consumers, creating value if the transaction costs associated with the direct sale are higher than the intermediary's opportunity cost. Demset (1968) described the workings of intermediation and transactional costs using the New York stock exchange as an example. In this type of market exchanges, supply and demand curves shift, forming bid and ask spreads that reflect the amount paid for intermediacy of exchanges. The bid ask spread depends on the elasticity of supply and demand, transaction costs and market transparency (11). The repercussion of this changing environment for firms and consumers will depend on the industry and the characteristics of the value system. In most industrialized countries, intermediation margins are close to 33% of the final price of goods (12). This means that a large sector of the economy may be affected. Benjamin and Wigand (1995) found that in the high-quality shirts market it might be possible to reduce the retail price by as much as 62% if wholesalers and retailers were eliminated from the value system. The manufacturer now has the possibility of selling its products directly to customers, or through integrated retailers that are more efficient, reducing the final selling price and increasing the profit margin.

Many companies, such as Sony, will start selling directly to consumers through the Internet. Even though Sony expects to sell only 20% of its products on line over the next three to five years, the impact of this decision on the electronics retail industry may be significant (13). Similarly, twenty-seven airlines, including the big five (American, Continental, United, Northwest and Delta), have banded together to create a unique travel

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(10) The company analyzed is Autodaq and operates in the wholesale used car auction market.

(11) For a more detailed treatment of intermediaries theory, see Spulber (1999).

(12) OECD Report on electronic commerce [www.oecd.org](http://www.oecd.org).

(13) *E-Commerce Times* (01/02/2000), "Sony Shocks Japanese Dealers with Direct Sales Web Site", by Rob Spiegel.

site where they will be able to offer fares, ticketing and other services. One of the most important aims of this new initiative is to cut the \$5 to \$10 dollar commission fees paid to online brokers, in a business that according to Forrester will create US\$64 billion in online ticketing (14).

The argument in favor of intermediaries relies mainly on the positive externality that intermediaries create by increasing the manufacturer's demand. The special services, distribution channel and expertise offered by retailers may create enough value to justify their presence. Amazon.com is a clear example of the new intermediaries created by the Internet. According to the Boston Consulting Group (15), the revenues from transactions on e-marketplaces will only generate significant revenues for the largest markets such as the Stock Exchanges. The source of revenues is more likely to come from the "added value services" that increase consumers' perceived value. For example, in the case of Enron, an energy-related company, many traders believed that price transparency was going to erode earnings. However, Enron went ahead with its online branch, becoming one of the leading companies in commodity trading, until financial irregularities led to its demise. Even though trading margins were significantly reduced, the benefits of increased trading volume and savings from the automation of different processes were considerably higher. Since its creation in 1999, Enron Online has handled commodity trades worth some \$650 billion, and Enron's revenues grew from a mere \$7.6 billion in 1986 to \$101 billion in 2000 (16). Charles Schwab experienced a similar explosion in trading volume when it decided to move its traditional customers to the on-line trading format while cutting prices. These examples show us that entering e-channels with the appropriate strategy can create an enormous competitive advantage for traditional and dot.com companies. The interesting implication is that the Internet has allowed firms to simultaneously increase customers' willingness to pay and, because of the significant jump in volume, reduce the cost of providing products and services.

## 2.2 Value Creation and Willingness to Pay

Value on the consumer's side of the value system is created by all the activities that increase the consumer's willingness to pay ( $B_V$ ) for a firm's offering, i.e. the combination of products, services and information. A consumer's net valuation of a product will depend on her gross willingness to pay, which derives from the consumption of the good minus the transactional and use-related costs associated with the acquisition of that particular offer. The benefit drivers are, therefore, related to search costs, customization, brand value, customer satisfaction, etc.

The consumer's willingness to pay increases if the costs related to the transaction, such as search and transportation costs, are reduced. Similarly, the willingness to pay can increase if the firm differentiates the product or provides value-added services. When buyers find the desired item, they buy it from the firm that leaves them the greatest surplus, i.e. the difference between their net willingness to pay and the final price charged. For example, consider a consumer who wants to buy a DVD player. Table 2 shows the different choices the consumer came up with after her search. She has narrowed down the choices to three brands. Each brand has different options and service and repair guarantees, affecting the gross willingness to pay (17).

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(14) *E-Commerce Times* (01/13/2000), "Airlines Band Together to Launch Travel Site", by Mary Hillebrand.

(15) *Boston Consulting Group* (12/12/2000), "Electronic Marketplaces: Surviving the Shakeout", by Andy Blackburn, Harold L. Sirkin and James P. Andrew.

(16) *The Economist* (06/30/2001).

(17) Note that the same product might lead to different valuations for consumers with heterogeneous tastes, depending, for example, on the brand. That is why even though Sony's DVD may have a higher price, some people still prefer it.

**Table 2. Value Creation and Willingness to Pay for DVD players**

	<b>Option 1</b>	<b>Option 2</b>	<b>Option 3</b>
Gross WTP	1000	800	1300
Search Cost	-100	-100	-100
Investment	-100	-50	-150
<b><i>Net WTP</i></b>	<b><i>800</i></b>	<b><i>650</i></b>	<b><i>1050</i></b>
Price	600	500	1000
<b><i>Surplus</i></b>	<b><i>200</i></b>	<b><i>150</i></b>	<b><i>50</i></b>

Time and effort is spent searching for the good. Suppose the consumer incurs a fixed cost of 100. Furthermore, each brand of DVD will require some specific investment in its operation, i.e. learning how to operate it. The net willingness to pay is the difference between the gross willingness to pay and the costs incurred by the consumer. For the same price, the customer would prefer option 3, as it results in the highest net willingness to pay. Taking into account the prices, Option 1 offers the best “value for money” or consumer surplus.

The effect of the Internet on the consumer surplus received by the customer is twofold:

1. The Internet reduces *search costs*, which increases the customer’s net willingness to pay. Also, the Internet increases the number of suppliers a customer can reach and so increases competition between suppliers. This puts downward pressure on prices in the market, increasing consumer surplus.
2. The Internet allows customers to expand their options. Therefore, new options become available, with potentially higher net willingness to pay. Furthermore, the Internet provides customer information that allows firms to *customize* their offering and raise customers’ willingness to pay.

### 2.2.1 Search Costs

Buyers are usually constrained by the information available relating to prices and product characteristics. Significant search costs are incurred in locating vendors and products, and comparing prices when making a purchase. These costs reduce consumers’ willingness to pay, decreasing the consumer surplus.

Reducing search costs by increasing transparency and facilitating comparison is one of the most important effects of the Internet. In relation to our previous example, suppose that the Internet cuts search costs by half. With the help of Internet-based technology, buyers are now able to obtain information about prices and product characteristics from a greater sample of sellers at lower costs than before. This increases the customer’s net willingness to pay by 50. In addition, the selection available to the customer may be wider, having reached

more potential suppliers. Finally, the competitive effect of the Internet reduces prices in the market, further increasing consumer surplus. Different types of search technologies such as search engines and shopbots, which help consumers to find the lowest prices and bargains, enhance the transparency provided by electronic markets (18).

### 2.2.2 Product Differentiation

As the example indicates, some firms may charge higher prices than competitors if they are able to differentiate their products and increase consumers' perceived value ( $B_V$ ).

Customers may be willing to pay a premium price for quality service, brand name and trust. For example, Amazon.com holds a more than 80% market share in the online book retail industry and charges higher prices than other competitors (Clay et al., 2001). This demonstrates that what matters to customers when buying on electronic markets is not only low prices. Similarly, a survey conducted by McKinsey & Company found that most online shoppers do not in fact search for lower prices as intensely as was thought. More than 80% of online shoppers for books, toys and CDs buy from the first site they visit. However, for durable goods such as electronics, the percentage of shoppers buying on the first site is 76% (Baker et al., 2001a, b).

Firms develop a differentiation advantage if they are able to increase consumers' willingness to pay ( $B_V$ ) for their products. As we have already noted, willingness to pay can be increased in two ways. First, reducing the costs the consumer incurs in the shopping process (i.e. search costs) affects the consumer's net willingness to pay. Second, the gross willingness to pay is increased by a number of activities such as the value-added and information services offered by the firm, the physical characteristics of the good, the brand image, and the tailoring of the product to the consumer's wishes. Brand image and value-added services have not been directly impacted by the evolution of electronic markets; however, the investment in these types of drivers are today more important to achieve a differentiation advantage. Furthermore, the Internet has allowed firms to be more knowledgeable about their customers. Analyzing click-streams, for example, provides information that can be used to customize and personalize the offer being made and thus increase customers' willingness to pay.

## 3. Value Appropriation and the Role of Prices

Achieving cost and differentiation advantages are the most important determinants of strategic positioning. The Internet has created new opportunities to articulate and develop such advantages on the supply side and on the willingness-to-pay side. The main drawback of this changing environment is the increasing pressure on overall profitability. Lower search costs have the effect of increasing the buyer's perceived value, and lower transaction costs reduce firms' cost structure, i.e. more value is created, but at the same time it is not clear how firms can appropriate this added value. The solution to this appropriation challenge crucially depends on the competitive environment: rivalry, entry barriers, the new equilibrium between the firm, its customers and its suppliers, and the pricing power this allows. In addition to potentially increasing competition, the Internet has made it possible to organize electronic markets, thus changing the feasible pricing mechanisms.

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(18) Examples of this type of price search site are mySimon, Dealtime, Pricewatch and Pricescan.

### ***3.1 Increased Competition and Entry of New Competitors***

A senior vice president of Lehman Brothers, New York noted, when talking about the effect of electronic marketplaces on the Chemical Industry, “It’s pretty clear that with e-business you have more to lose on sales price compared to how much you save on raw materials, simply because you are selling more specialty products and buying more commodity products –where markets are very efficient already– to manufacture them (19).” This reflects the pressure of competition and market transparency on the profitability for some industries.

Depending on firms’ market power, the possible outcome can be completely different. For example, if there is only one firm in the market, with all the market power (monopoly), that firm is able to appropriate more of the added value created by the introduction of Internet from consumers and suppliers (20). If firms have no market power (competitive scenario), the result is completely different. Prices will be closer to the opportunity cost and there will be fewer opportunities for appropriating value from the consumer side. This means that buyers will increase their consumer surplus, appropriating most of the value created. Firms will only appropriate the added value created through cost reductions if they are able to reduce the prices they pay to their suppliers, while preventing the prices charged to consumers from dropping at the same rate. If market rivalry is high and the barriers to entry low, the existing firms will need to decrease prices, giving up a substantial part of the added value created through the Internet.

The arrival of the Internet has increased rivalry, especially within the online retail channel. Industries with lower entry barriers will face greater competitive pressure in the short run, reducing aggregate profitability and market prices. Even though the investment in IT infrastructure and other marketing and branding costs would seem to increase entry barriers, Lucking-Reiley and Spulber (2001) argue that entry costs are be lower for some dot.coms since new companies can outsource IT infrastructure and software, thus reducing their initial investment. Furthermore, easy access to the capital market reduces financial entry barriers.

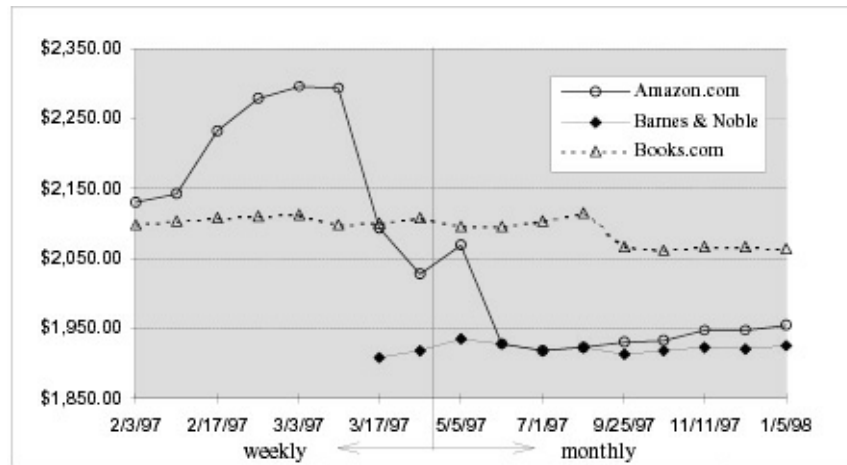
In the book industry, Bailey (1998b) examines the impact of the entry of the large brick-and-mortar bookstore Barnes and Noble on the Internet market and the reaction of the incumbent leader Amazon.com. The main result is that Amazon reduced its prices to match those offered by Barnes and Noble for the same basket of books (see Figure 2). Is also interesting to note that in this process B&N reduced prices only in the Internet channel, leaving the prices at physical retailers unaffected.

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(19) *The Industry Week* (8/13/2001), “E-Rosion?”, by Tim Stevens.

(20) It is important to note that not all the value appropriated from cost reduction comes from extracting value from suppliers. Other drivers such as learning processes or improved process efficiency can generate cost reductions that do not necessarily come from the supplier.

**Figure 2. Market Basket Price at Amazon, Barnes & Noble and Books.com**



Source: Bailey (1998b).

Friberg, Ganslandt and Sandström (2001) analyze the problem of price differences across traditional and electronic channels by setting up a model that compares a conventional retail firm and an independent electronic retailer in a duopolistic market structure with a monopolistic firm selling in both channels, electronic and conventional. Using a sample from the Swedish books and CDs market, they find evidence of lower prices in the online channel for firms selling exclusively through the Internet. The intuitive explanation for this outcome is that monopolistic firms in on-line markets charge a higher price to avoid cannibalizing sales from their conventional retail stores. Independent electronic retailers, by contrast, compete with conventional firms by charging a lower price. The empirical results also demonstrate significant price dispersion for both traditional and online retail stores.

The arrival of the Internet, together with powerful search engines, potentially creates a perfect information environment in which firms selling at the lowest price are posted. The impact on price competition may result in all firms reducing prices to opportunity cost. However, this is not exactly how it works. Following Ellison and Fisher (2001), search engines that cause all retailers to go out of business and that post only the lowest-price retailers will have a short life in the market. The main reason is that price search engines appropriate some of the value created through the transaction (21). If only firms selling at a price equal to opportunity cost are posted, the search engine will be unable to appropriate any value, as there will be no margin left to appropriate. Kephart and Greenwald (1998), following Salop and Stiglitz (1982), provide one of the earliest theoretical treatments on how search engines may affect competition in electronic markets. In these authors' model, firms randomize prices between two types of buyers in order to price discriminate between active bargain searchers and non-searchers. That way firms can compete for the active searchers with lower prices, but compensate by charging a higher price to the others.

(21) For example, Yahoo! charges 2% for transactions completed through their web site.

The reduction of consumers' search costs has interesting effects on market competition and price setting. Customers now have the possibility of acquiring more information about prices and product characteristics at lower costs, thus intensifying the competition among sellers and giving market power to buyers. This has led to the hypothesis that competition in electronic markets will take the form of Bertrand competition, where firms compete purely on prices, reducing industry profitability. Even though search costs may be expected to be lower on the Internet, implying *lower prices* and *lower price dispersion*, the hypothesis is not supported by most of the recent empirical evidence. There exist several empirical studies of prices on electronic markets, most of them focused on books, CDs and software(22).

The earliest analyses show that prices on the Internet are higher than in the traditional channels. The study reported by Lee (1997) compares the prices of used cars in conventional and electronic markets from 1986 to 1995. He found that prices were higher on the Internet than in conventional channels. A possible explanation for this outcome is that the study was based on prices formed through auctions, where the consumer with the highest willingness to pay is the one who obtains the unique good. This implies that prices for auction markets will be usually higher than traditional markets. Bailey (1998a, 1998c), using a sample of books, CDs and software from US retailers over the period 1996-1997, also found higher prices on the Internet channel.

However, most recent empirical evidence shows a different picture. Brynjolfsson and Smith (2000), for example, compare prices of books and CDs sold through conventional and Internet retail outlets. The selection of retailers was made based on the list of general retailers provided by Yahoo. The study tracks 20 book and CD titles selected from current best-seller lists and also from a random selection of titles. The minimum price found in each channel shows that Internet prices including shipping and handling and taxes are lower than conventional prices by \$1.09 for books and \$1.23 for CDs. Similarly, Clay, Krishnan and Wolff (2001) find lower prices on the Internet channel and significant price dispersion. The data set covers books from 32 on-line bookstores between August 1999 and January 2000. The selection of books includes three categories of books: *New York Times* best-sellers, computer best-sellers, and a random sample of books in print. The methodology followed was selecting weekly minimum prices for 399 books from book retailers included in the main price-comparison search engines. Average prices are lowest for the *New York Times* best-sellers (69% of the publisher's recommended price), higher for computer best-sellers (78%), and highest for random books (86%). The results for price dispersion, measured using the standard deviation as a percentage of the average price, are inversely related to price. The highest dispersion is for *NYT* best-sellers (28%), followed by computer best-sellers (16%) and the lowest for random books (13%). Given the results for price dispersion reported by Sorensen (2000) for the traditional prescription drugs market, one would expect the price levels and dispersion to be lower for the more frequently purchased items.

Other studies look at used cars, travel agents, life insurance and real state markets (23). Scott, Silva and Zettelmeyer (2000) found that the average customer pays approximately 2% less for cars bought using online services compared to traditional channels. According to the authors, consumers will benefit from buying online even though dealers will not offer different prices to online and offline customers. However, the Internet helps to find the

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(22) See Smith et al. for a complete survey of empirical studies about prices in electronic markets.

(23) For examples of these industries, see Clemons, Hann and Hitt (1998) on travel agencies, Brown and Goolsbee (2000) on life insurance, and Kevin Crowston and Rolf Wigand (2000) on real estate.

cheapest dealer in the area, decreasing search costs for the customer and reducing mean prices. Furthermore, they find that dealers' gross margins from sales through the Internet channel are significantly lower than gross margins earned selling vehicles in the traditional way. However, because online customers are cheaper to serve, the net effect makes dealers better off working through the Internet channel, indicating that the online branch is able to retain part of the value created on the supply side.

These empirical studies provide evidence of lower prices and lower menu costs on the Internet channel, but reveal a significant degree of price dispersion. Therefore, the hypothesis of the Internet leading to Bertrand competition with lower prices and lower price dispersion is clearly not borne out. Deviations from the Bertrand assumptions of product homogeneity, zero search costs and symmetric information lead to price dispersion. Several models have been developed to study the effect of these different assumptions on the Bertrand outcome. One of the earliest contributions on the effect of search costs on prices is the paper by Diamond (1971) (24). Diamond develops a model in which firms produce homogeneous goods and compete on prices. Assuming that prices are not perfectly observed by buyers and therefore buyers must incur a search cost to assess the true prices, he finds that equilibrium prices are set at the monopoly level. Building on this result, several papers find price dispersion in equilibrium when consumers obtain prices by searching in a sequential or fixed sample way (Burdett and Judd, 1983; Stahl, 1989, 1996; Janssen and Moraga, 2001). Other papers find price dispersion when agents have different valuations of the good (Diamond, 1987) and in oligopolies with heterogeneous consumers (Varian, 1980). In Shilony (1977) some consumers have preferences for some types of products due to the presence of switching costs and will be willing to pay a higher price.

### ***3.2 Value Appropriation and the Choice of Pricing Mechanisms***

The Internet infrastructure, together with the improved market efficiencies, has made the application of diverse pricing mechanisms feasible. As pricing is crucial to appropriate any of the value created, firms should carefully analyze the potential for adjusting their existing pricing mechanisms. Depending on the market power and the number of buyers and sellers involved in market transactions, different pricing mechanisms can allow greater or lesser value appropriation by firms. In what follows we classify the different types of mechanisms than have been observed.

Under perfect competition all consumers and producers are assumed to act as price takers. This means that firms are unable to appropriate more value than what is necessary to cover their opportunity costs. However, this assumption is relaxed when there are a few players on one side of the market, which translates into market power. The traditional example of market power is when there is only one seller. This exclusive seller or monopolist increases the price by reducing the output up to the point where the marginal revenue obtained from selling the last unit equals the marginal cost of producing it. This way the monopolist appropriates more of the consumer surplus, thus increasing profits. The use of market power in transactions has traditionally been associated with the providers of goods and services. However, the Internet has empowered smaller buyers and enabled them to extract some of the value from sellers by, for example, the use of reverse auctions. These changes in the traditional relationships between buyers and sellers and their value appropriation potential have created a new competitive environment on electronic markets.

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(24) See also Salop (1977) and Salop and Stiglitz (1982).



The number of agents involved in the price-setting process is important, enhancing efficiency as well as creating more opportunities for appropriating value. In traditional markets the most common relationship between buyers and sellers is one-to-one. A single buyer accepts or rejects the seller's price offer, depending on her valuation of the good. Electronic marketplaces have increased the spectrum of buyer and seller relationships, making different pricing mechanisms available, such as auctions or exchanges in which multiple agents interact. These pricing mechanisms can result in more gains for buyers and sellers, but in other circumstances may change the "microstructure" of markets, affecting efficiency and the participants' bargaining power (Bakos, 1998 and 2001).

Pricing mechanisms on electronic marketplaces can be divided into four main groups, according to the relative market power of buyers and sellers. The number of agents who interact at the moment of price setting is obviously related to the relative market power of buyers versus suppliers. Note that this classification covers both the firm's interactions with its suppliers (the firm as buyer) and its interactions with its customers (the firm as supplier). Figure 3 presents the classification of different possible pricing interactions, which we discuss in the following sections.

**Figure 3. Pricing Mechanisms in Electronic Markets**

		Seller's Market Power	
		High	Low
Buyer's Market Power	High	<b>Bilateral Pricing</b> Negotiated Prices	<b>Buyer Sets Prices</b> Reverse Pricing Reverse Auctions
	Low	Fixed - Dynamic Auctions	<b>Exchanges</b>
		<b>Seller Set Prices</b>	<b>Competitive Pricing</b>

### 3.2.1 Buyer-Low / Seller-Low

The situation in which both buyers and sellers have low market power closely resembles a perfectly competitive market where extended opportunities for value appropriation are not available to firms. In this case, buyers are in the best position, as they appropriate the entire consumer surplus. Nevertheless, there are opportunities in this market situation for independent intermediaries to create and appropriate value through the creation of these markets. When more than one buyer and seller are involved in the transaction the result is called an *exchange* relationship. Exchanges are electronic marketplaces where buyers and sellers interact to trade different types of products and set prices through their interactions. These exchanges create value by temporarily matching supply and demand and require a real time bid-ask matching process (Sawhney and Kaplan, 1999). The best-known exchanges are the stock exchanges, where shares, commodities and other products are traded.

### 3.2.2 Buyer-Low / Seller-High

In traditional market relationships between buyers and sellers, prices are most of the time fixed and set unilaterally by the seller. When we buy a book or a car, the seller directly sets the price. This situation allows more value appropriation for firms, decreasing the buyer's consumer surplus. Even in markets with many firms it is possible to extract some value from consumers using different mechanisms of price discrimination. The key requisite is for the supplier to possess some market power, i.e. restricting output makes it possible to increase the price for the remaining units sold.

One of the most important innovations in pricing techniques allowed by the information revolution is *dynamic pricing*. This pricing mechanism allows firms to change prices with a higher frequency, depending on customer characteristics or market supply and demand conditions. The concept of dynamic pricing is closely related to the idea of price customization, in which firms charge different prices to customers according to a discriminatory variable. This factor of discrimination can be time, consumer characteristics (student, business), product availability control, etc., giving the seller opportunities for price discrimination across consumers with different willingness to pay. A popular example of price customization based on time is yield management, also called revenue management. This mechanism consists of the use of market segmentation and inventory availability control to maximize firms' revenues. Yield management systems help hotels, airlines, car rental firms and others to manage inventory availability according to demand uncertainty across time. For example, airlines dynamically change fares according to seat availability, day of the week, time of the day, etc. Before electronic markets came into widespread use, only a few businesses such as airlines used price customization techniques to enhance revenues. Today, however, the technological platform provided by the Internet makes these pricing applications available to many more businesses. The main problem is how to implement these techniques in an efficient way. Firms can customize prices according to consumer characteristics, charging a higher price to customers who are willing to pay more. Following the taxonomy of price discrimination given by Pigou (1920), we can classify price discrimination methods in three types:

*First degree* or perfect price discrimination is when the producer is able to capture all the value created in the value system. This is only possible if the producer has perfect information about the consumers' willingness to pay for each unit of the good and the opportunity cost of serving each unit to each consumer. This way the firm is able to obtain the maximum profit. These conditions are unlikely to be satisfied in reality.

*Second degree* price discrimination is when the firm offers different bundles with alternative prices and quantities to heterogeneous consumers. The producer introduces different bundles of goods as a self-selecting mechanism to separate customers with different willingness to pay. For example, telephone companies offer their customers a menu of calling plans. Each customer selects the plan that best fits his needs. Customers that make a lot of long-distance calls will be willing to pay an upfront fee in order to benefit from a low per-minute rate. Customers that have few long distance calls will prefer a plan with a low fixed fee and a higher per-minute rate. These plans need to be designed to prevent consumers from arbitraging opportunities (organizing a call center at your house for all the neighbors and their long-distance calls). Even though the firm is not able to completely appropriate all the value created, the revenue generated is higher than under an outcome with a single option for all consumers.

With *third degree* price discrimination the firm charges a different price for each group of customers, according to the signals these groups provide. Some of the most common categories for grouping customers are personal income, time, age and activity.

The new technologies combined with the Internet allow firms to obtain a better knowledge of customer characteristics and willingness to pay, increasing the efficiency of price discrimination policies. For e-retailers it is possible to change prices, web content, and offers in seconds, according to market responses. Firms selling online can easily obtain detailed information of the buyer's characteristics by using what are known as *cookies*. Relying on the advantages of data processing and forecasting, more targeted offers can be made.

Even though the technology allows the effective segmentation of potential consumers, the way price discrimination is conducted is still an issue. The reputation of online retailers may be seriously affected if they are caught implementing price discrimination. Amazon.com recently conducted a "test" to see how much customers were willing to pay for DVDs. The price charged to non price-sensitive customers was considerably higher than the price offered to new customers for the same item. This situation was finally discovered by customers and ended in a series of customer complaints. However, for some goods such as concert and sports tickets the opportunities for value appropriation are even higher in the Internet channel. For example, the company Tickets.com has been able to charge prices 17% to 45% higher than off-line channels, increasing revenues for some events by 45% (Baker, 2001). Consumers are more likely to accept price discrimination tactics when the supply of the good is constrained or the good is perishable. A concert performance takes place on a specific day. As capacity for the performance is filled, prices increase. Consumers are likely to accept this reasoning. However, DVDs do not become scarce over time. Charging a different price for the exact same good today and tomorrow is unlikely to be accepted as fair pricing and a potential consumer backlash may follow.

When there is a large number of buyers relative to suppliers, firms can appropriate much more value by using an auction mechanism than by using fixed or dynamic pricing. A seller with market power sets the minimum price he is willing to accept for the item offered for sale, and then a group of heterogeneous buyers bids simultaneously. The buyer with the highest willingness to pay acquires the item, typically paying a higher price than the price the firm would have set based on its limited information about the distribution of customers' willingness to pay.

Even though these pricing methods are probably more efficient, given the complexity of the infrastructure needed to support such transactions, it has only been possible to use them since the introduction of the Internet. The ability to develop and use such a complex pricing system might in itself constitute a sustainable competitive advantage. Dell Computer entered the PC industry with its direct customer access model where it builds-to-order and prices-to-customer. Competitors have frantically attempted to provide an answer to the Dell model. On the supply chain side, many competitors have been able to implement a build-to-order or assemble-to-order model. The most difficult part of the Dell model has been the imitation of its revenue model. Dell's pricing system is extremely responsive to customer characteristics and supply and demand conditions in the value chain. One might conclude that Dell's overall positioning is difficult to imitate, in particular because of its revenue model and pricing system.

### 3.2.3 Buyer-High / Seller-Low

Pricing mechanisms where the buyer sets the reservation price for a good or service are becoming increasingly used in electronic markets. Depending on how the process of reverse price setting is conducted, we can distinguish between *reverse pricing* and *reverse auctions*. In reverse pricing the consumer sets the maximum price he is willing to pay for a certain good, but receives asymmetric information regarding the exact characteristics of the deal. Transactions conducted this way have the special feature that customers are buying goods damaged by uncertainty. Usually firms discriminate among consumers by offering different quantities of the same good at different prices to consumers with different willingness to pay. However, this can also be done by changing the product quality and discriminating among consumers with different preferences with respect to quality. The typical example is airlines that offer different qualities of travel service, or special ticket options. By doing this, they are able to capture the maximum possible value from each customer. In the case of reverse pricing, since the good sold is damaged by the uncertainty about the real characteristics of the good, it can be sold at huge discounts. This is another reason why in this case it is appropriate that the buyer should set the reservation price. Firms like Priceline and Hotwire use this model of reverse pricing. Priceline is a dot.com company that offers airline tickets, car rentals, hotel rooms, home loans, long distance services and new cars. For example, to acquire an airline ticket the client has to disclose the desired itinerary and day to travel and the maximum price he is willing to pay. He is not able to choose the airline carrier or specify the time of travel and it is not possible to make any changes on the ticket. Then Priceline searches for the matching characteristics and, if it is found, immediately charges the buyer's credit card, sending the final specifications of the deal to the customer.

Reverse auctions are seen mainly in B2B commerce and consist of firms quoting their maximum willingness to pay and receiving offers from multiple suppliers below this price. The main difference with reverse pricing is that buyers have perfect information about the specifications of the good they're buying and also that prices are set in auction style. For example, in a reverse auction conducted by FreeMarkets, the process starts with a buyer of a certain input stating the maximum price he is willing to pay for the good. Several suppliers bid online in real time and observe what the other bidders are offering. A company searching for plastic car parts, for instance, started the reverse auction with the most recent price paid for those inputs. In about ten minutes the competitive bidding reduced the initial quotation by about 31% (25).

As many of the goods traded on the Internet are information-based, they have high initial development costs but extremely low reproduction costs (see Shapiro and Varian, 1999). This characteristic of information goods is contributing to the increased use of free offers to consumers as a means of increasing the flow of customers or enhancing brand image. However, little (or no) value is appropriated in this way, at least not in the short run. This has led firms to look for new ways of pricing these types of goods. Bundling seems the most suitable pricing mechanism. This pricing technique consists of bundling different items and selling the bundle for a fixed price. The firm is able to appropriate more value through bundling when the willingness to pay for the individual items in the bundle are negatively correlated across consumers (Pashigian 1998). Bundling information goods, therefore, increases profits for multiproduct monopolists when consumers have heterogeneous

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(25) *Fortune Magazine* (20/03/2000), "Going, Going, Gone: The B2B Tool That Really is Changing the World", by Shawn Tully.

valuations of the information items (Bakos and Brnjolfsson, 1999). Dolan and Simon (1996) describe three types of bundling: *pure price bundling*, which consists of only one bundle offered to consumers, without the possibility of selling the items separately; *mixed price bundling*, when the products can be sold in a bundle or separately (e.g. McDonalds Menus); and *tie-in Sales*, where the bundle depends on one product or tying good, which has the greatest value for the buyer, who agrees to buy other complementary products (for example, buying a Mercedes Benz implies acquiring special services and parts from the same company).

The following example illustrates the bundling problem. There are two consumers and two goods are sold. The consumers' willingness to pay for the goods are as follows:

	Good 1	Good 2
Consumer 1	€100	€50
Consumer 2	€50	€100

What are the different pricing strategies? First, both goods can be sold to both customers. As no customer will pay more for the good than his willingness to pay, the prices for both goods cannot exceed €50. Assuming that the firm has no costs, total profit is €200. Second, the firm can sell each good only to its high valuation customer, i.e. sell good 1 to customer 1, and good 2 to customer 2. The maximum value the firm can appropriate in this case is, again, €200. Finally, the firm can attempt to sell only a bundle of the goods. Each consumer values the total bundle at €150. Therefore, the maximum the firm can hope to earn is €150 per customer, or €300 in all. Bundling clearly dominates selling the items separately. The key to the success of the bundling strategy is that the valuations of the customers are negatively correlated. Customer 1 values good 1 more, while customer 2 values good 2 more.

### 3.2.4 Buyer-High / Seller-High

Negotiated pricing is the oldest way of price making, resulting from direct negotiation between buyers and sellers. However, under this pricing scheme the agent with the highest bargaining power will appropriate the value. Negotiated prices are usually less convenient than other pricing mechanisms, as negotiations are time-consuming and the bargaining power and negotiation skills of the parties involved is critical in the price-setting process.

The price-setting opportunities for buyers and sellers thus depend on their relative bargaining power. The Internet not only has affected their relative bargaining power, but also has implications for the type of mechanism that can be implemented given the new technology.

## 4. Conclusion

In this article we have argued that the effect of the Internet on business strategy cannot be reduced to a simple statement about the price level “before” and “after” its arrival. To understand the impact of the Internet we need to analyze both the effect on value creation and the effect on value appropriation. We have argued that, with respect to value creation,

the Internet, on the one hand, reduces production and transaction costs. We have distinguished between the cost effect on existing activities, the effect on the relative performance of markets versus hierarchies, and the effect on intermediation. On the other hand, the Internet increases customers' willingness to pay by reducing search costs and increasing the level of customization. Overall, we should expect the Internet to have led to more value creation. Why is it, then, that firms do not necessarily prosper? The Internet has also affected the value appropriation opportunities in the market. Both rivalry and the relative market power of buyers versus suppliers have been affected. This obviously influences the value appropriation possibilities of buyers and suppliers. Furthermore, this new technology has enabled alternative pricing mechanisms such as auctions and real-time dynamic pricing. Therefore, it is not surprising that the evidence on pricing and the Internet should be so inconclusive, suggesting that, while average prices may be lower, price dispersion has increased considerably. These effects can only be understood through a thorough analysis of the value creation and value appropriation potential since the arrival of the Internet, which has led to a significant transformation of many industries.

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