ICT and Household-Firm Relations

by

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Abstract

This paper discusses how ICT and emerging electronic commerce in consumer products influence the relative efficiency in production of households and firms, resulting in changes in the division of tasks between these two types of agents. Increased information and competence of households, in combination with stiffer competition among firms, will also increase the power of households relative to firms, at least in a long-term perspective with free entry of firms. Households will also get more powerful channels to influence firms directly, i.e., beside the indirect influence via market transactions. We point out that this will result in various counter-reactions by firms, including increased differentiation of products and prices. Finally, we briefly consider various limitations and obstacles to electronic commerce in a long-term perspective.

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The new information and communication technology (ICT) has profound consequences for relationships between households and firms. When household members become better informed about available products and prices, they become more competent as buyers and product users. They will also be more able than earlier to communicate their needs and experiences verbally to firms and thus to influence production of firms not only indirectly via market transactions but also directly via dialogues with firms.

One consequence is changes in the relative efficiency of households and firms in performing different tasks, which induces changes in the division of tasks according to new comparative advantages of these two types of agents. In particular, we hypothesize that households will be more able to participate in the production of their own services, partially with help from firm-provided tools and systems.

Another consequence is that the powers of households tend to increase relative to firms. The explanation is not only better information among households about available products and prices, lower costs for consumers when switching from one supplier to another, and consequently, stiffer competition among firms. Household powers (influence on firms) will also increase because of their stronger position in their direct dialogue with firms. The powers of households is further enhanced as a result of household-to-household dialogue over the net, which improves the information of households in a fundamental way. But the increased market power of households is likely to induce countermeasures by firms. Important examples are increased price and product differentiation, development of new products and product assortments (varieties), new ways of assuring customers of product quality and of establishing loyalty among customers, and development of new types of marketing activities.

This paper discusses these closely related issues. To do justice to the richness of the consequences of ICT for the relations between households and firms, we have chosen a non-formalized exposition. It incorporates Gary Becker's (1965) framework, where the household is regarded as a combination of a small firm and a consumer unit, and Alfred Hirshman's (1978) distinction between voice, exit, and loyalty as mechanisms for influence.

New ways for households to obtain information

We base our discussion on an assumed future situation when ICT is more advanced than today and its applications are more mature and widespread. More specifically, we assume that it is easy for consumers to scan a wide assortment of available products and the prices charged by different sellers. By specifying the type of merchandise sought and by screening alternatives, consumers can identify a limited set of suitable options that they can view in detail (see, e.g., Alba et al., 1997, pp. 38-39).[1]

All this is facilitated by the interactive nature of ICT, with customers asking questions and receiving individualized computer-mediated answers. The enormous capacity of ICT, compared, for example, to telephone communication, enables this individualization. The process is limited only by the availability of information in various databases, which continually accumulate new information because of the interaction process.

Two new types of information suppliers strongly enhance information availabilty for households. One type includes computer-mediated *search agents* that supply extensive, highly structured information according to customers' specifications. The search agents can suggest the most adequate alternatives for each household. Moreover, this extensive and precise search process can be pursued at low costs.

The other new type of information supplier includes fora for *consumer-to-consumer interaction* – virtual communities, news groups, and chat groups. While virtual communities are tightly organized customer networks, where members interact systematically with each other, news groups and chat groups are spontaneous networks, where consumers with common interest communicate. They provide participants with opportunities to compare and aggregate experiences, and this creates a wide range of information and experiences. In contrast to transactions in traditional information markets, this information exchange occurs not only between two agents, but also between one agent and an information pool to which many agents have contributed (Ghosh, 1998). Consumer-to-consumer fora gradually improve their information systems the same way that search agents gradually improve their systems. In particular, improved systems mean that information is increasingly structured to enable a visitor

[1] Of course, consumers also frequently take the initiative to acquire information in traditional markets, such as when they study different types of consumer reports and visit stores.

to obtain information from households with backgrounds and interests that are similar to the visitors' own backgrounds and interests.[2]

The most characteristic feature of the information acquired from these fora is that the information provides experience and knowledge not only of some specific individual (such as an expert) but of many individuals with different backgrounds. This information is valuable because it provides a broad cross-section of perspectives and experiences of individuals who have often actually used the products in question. This type of information may be particularly useful for consumers who are entering a product area for the first time, because they may not know what kind of products and features to look for.[3]

The quality of information generated by members of virtual communities and news and chat groups is not necessarily better than information provided by experts, for example, in consumer reports, in company-supplied messages, or in electronic search agents. Instead, it is a different, complementary type of information based on users' perspectives.

So more than before, households can find the most appropriate products and services at low costs. Moreover, from the households' viewpoint, both types of agents – search agents and fora for consumer-to-consumer interaction – have a common feature. In principle, they are independent of the commercial interest of producers and retailers.

When households get better information about products and prices because of ICT, traditional problems of asymmetric information in consumer product markets – to the advantage of firms – will be mitigated. In terms of the functional quality of products (in contrast to technical quality), many households will be better informed than firms – thanks to consumer-to-consumer interaction. Here, we may talk about "reverse asymmetric information" – until firms have also learned to use information from the new fora.

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[2] See, for example, Cint.com. This special community pools information about experiences from recently purchased products by many different households. From the start, the information is structured according to detailed schemata established by the community's host. In exchange for giving information to the information pool about their own recent experiences of purchased products, households can share information, which others contributed to the pool, about any product that they are thinking about buying.

[3] For instance, new parents may find it difficult to choose a baby carriage that is suitable for their specific needs. They may not have friends or neighbors in a similar situation. But on the Web, there is never a lack of advice. Any reader may confirm this by visiting a virtual community or news group; see, for example, http:/www.parentplace.com.

The household as producer and consumer

Let us now look at the consequences of increased information availability among households for their production and consumption activities. Following Becker, purchased market goods, q_i (such as food, housing, sporting goods, etc.) are treated as intermediary inputs into household production. In combination with time, t_j, these goods are transformed into *final services*, s_j, by way of a household production function $s_j = F_j(q_i, t_j)$, which contains information about how to use the purchased products in the household production process. The produced services (eating, drinking, consuming housing services, exercising, etc.), rather than the market goods, then enter the household's preference function, $U(s_1,...,s_j,\ldots,s_n)$. This function is maximized with the household production function, household money income, and available time as constraints.[4]

Becker's approach has several advantages when analyzing the consequences of the ICT revolution. It allows a distinction between the effects of ICT on the household's production and consumption activities, and it provides a useful framework for discussing changes in the relative efficiency of households and firms in pursuing different tasks and in the relative market powers of these two types of agents. This makes the model useful for a discussion of ICT consequences for the division of tasks between households and firms.

When considering ICT consequences for consumer product markets, it is useful to distinguish between two different types of information. One type is simply knowledge about available market products, their qualities, and prices. This type of information (type 1) helps households select appropriate inputs (the q_i's) in their production processes. A second type of information (type 2) may instead be regarded as an (intangible) input to production. Here, the household uses an *information good* (i.e., a q_i in household production or information about the $F_j(\cdot\cdot)$-function itself) to produce utility-creating services (the s_j's in Becker's framework). An example of type 1 information is a list of available CDs and their prices, while the *content* of the CD (for example, text, mathematics, or music) is an example of type 2 information, which can be obtained via electronic media.

What then are the consequences for the efficiency of household production of the drastically increased availability of information? First, better information about available goods as inputs into household production (type 1 information) makes it easier to find and choose

appropriate q_i's, as well as to switch from one supplier to another; the exit option is strengthened for households. Second, the availability of better information goods as inputs (the q_i's) or about the household production function $F_j(\cdot\cdot)$, i.e., type 2 information, contributes to increased efficiency in the household's production process. As a result, the household becomes more efficient in producing *final* utility-creating services (the s_j's). Households will also enjoy lower prices because they have a larger number of competing suppliers to select from when they scan local and global markets more efficiently. In fact, there is already evidence that prices of consumer goods in Sweden are lower in Internet trade than in traditional retailing (Fölster and Pettersson, 1999).

All this helps households to produce high-quality household services at low costs. As discussed below, the household's ability to cooperate with firms in production processes will improve.

Through interaction with other households via electronic media, individual households may also learn to *evaluate* final services differently. Finding out more about other individuals' preferences may help them develop their own preferences, the $U(\cdots)$-function. After all, preferences are partly social phenomena in the sense that they are formed in the context of social interaction among people.

Take the case of someone who decides to buy a camera. On the Web, she obtains better information about the quality and price of different types of cameras and other photo equipment (the q_i's in the household's production function). By joining a virtual community or a news or chat group formed around photography, she finds out (besides through supplier information) how the camera equipment works (i.e., advice about the choice of an efficient $F_j(\cdot\cdot)$-function). For example, the buyer may acquire information about strong (weak) points of the product from users' viewpoints and how to handle these strengths (weaknesses). And by looking at pictures taken by others and by learning to take good pictures, her appreciation of photography will increase; hence her U(···)-function will also change. As a combined effect, she might become a good amateur or even an expert photographer and devote more and more time to this activity.

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[4] Our term *final services* corresponds to Becker's term *commodities*.

The division of tasks between households and firms

How will changes in the efficiency of household production influence the division of tasks between households and firms? The main thrust of our reasoning is that firms will provide tools and systems for households by which the latter can produce services on their own, including services that were previously produced by firms. In general, this means that household members rearrange their time allocation – from transporting themselves to various service providers and waiting to be served – to production activities done by themselves in their homes. The time-use flexibility in homes (thanks to ICT) also means that it becomes easier for households to use relatively inexpensive time when pursuing these activities. As a result, households can use their time more efficiently. Often, they may also be able to consume services at lower *total* costs (purchase price *plus* time cost) than before.

A *general* prerequisite for these developments is the new technology, manifest by the PC and the Internet. But expected, future, and profound changes in consumer product markets also rely on additional information and exchange systems provided by individual firms, which vary significantly from one product area to another.

When focusing on consequences for households, it is natural to concentrate on *retailing* – an activity that will clearly be drastically transformed because of ICT. It is usual to disaggregate the process of exchange in retailing into three dimensions: search, transactions (purchases), and delivery. We discuss a future situation when systems for search are much better than today, safe payment systems exist, and logistic systems for physical-product delivery have been constructed.

The possibilities for consumers to do searches and make transactions effectively on the Web will most likely differ strongly among products – in the case of physical products as well as services. Information economists in marketing often distinguish among search, experience, and credence products (Darby and Karni, 1973). In the case of s*earch products*, consumers can assess the quality before the purchase – examples include standardized products and services and well-known brands. In contrast, the quality of *experience products* is difficult to assess before purchase and use, although the quality can be accurately assessed after some use, and in some cases, perhaps after close physical inspection of the product, such as by test driving cars or by inspecting products in stores. For *credence products*, quality cannot be known even after prolonged use because it may take quite a long time before all important

quality dimensions are revealed.

It is tempting to hypothesize that products with search and credence attributes will often be bought through electronic retailing, while products with experience attributes will be bought through traditional channels except when an opportunity arises to repurchase the same experience product. The new electronic media have already turned out to be useful for experience goods in the first stage of the search process – the orientation about available alternatives – while the final inspection and the transaction (actual purchase) may occur in a traditional manner.

What will ICT mean for retailing in goods and services that traditionally required the customer's and supplier's physical presence – besides the obvious opportunity to get *information* electronically about available alternatives? For some services, ICT will enable households to take over the service production in their homes with help from firm-provided tools. In Becker's terminology, firms help households to improve the households' production processes (a better $F_j(\cdot\cdot)$-function) and to provide new inputs (new q_i's) in these processes. An obvious example is when households produce their own financial services, including the payment of bills, bank deposit transactions, repayments of loans, and management of financial assets, such as stocks and bonds. In these cases, electronic transactions mean that households are involved in the production of their own financial services.[5] Today, electronic transactions are also rapidly developing in insurance, where households have partly taken over retailing activities previously pursued by insurance brokers and salesmen (middlemen).[6]

Buying tickets or booking hotel accommodations includes another area in which households are taking over activities from firms. For travel, online ticket sales have few organizational constraints, perhaps because computer reservation systems have been in place for years.[7] As in the case of bank and insurance services, in all these areas households

[5] The driving force is not only increased convenience (independence of time and space) for households, but also reduced costs for firms when households make their transactions via Internet. The latter is reflected in extremely low operating costs – less than one cent to conduct a transaction as compared to more than a dollar if handled by a teller at a bank (Booz-Allen and Hamilton 1998, from an original publication in 1996; Reddman 1997). In a long-term perspective, these low operating costs are bound to result in lower prices of financial services.

[6] Some analysts project that by 2001, insurance premiums generated on the Internet will have increased by a multiple of 200-300 – compared to 1997, Magherio et. al.,1998.

[7] The cost is much lower for a ticket sold electronically by an airline than by a travel agent. Estimates suggest that the difference is about USD 7 (USD 1 instead of 8) to process a ticket. (Magherio et. al., 1998, Appendix 4; the figures are from Air Transport Association of America, 1997).

integrate retailing into their production activities.

In the future, we also expect further development in areas related to personal safety, comfort, and entertainment (*excitement*) – areas in which new applications are increasingly becoming available. Regarding personal safety, new electronic devices will make it easier for home owners to protect against trespassing and crimes and for parents to monitor their children (such as locating where they are at the moment). Regarding comfort, important examples include increased opportunities for people to: furnish and decorate their homes without personalized interior decorating services, try out clothing without visiting stores, and experiment with cosmetics without consultation from a cosmetologist. Regarding entertainment, people can experience adventures in exotic environments on the screen or with help from virtual reality equipment – as a complement or substitute for physical traveling.[8]

Another example where households take over tasks from firms (or other institutions) is the rapidly expanding system of self-care, which replaces hospital care in some cases. More and more therapies are taking place in patients' homes, with support of ICT (Bezold, 1998). Asthma and diabetes patients, for example, have become co-producers of their own treatments. They may check their condition, register the effects of different treatments and decide on part of their medication, while experts at the hospital provide monitoring and counseling online.

Via electronic media, knowledge-seeking patients can also obtain the latest findings about diseases, treatments, medical care, and new pharmaceuticals. Through virtual communities and other fora for direct consumer-to-consumer interaction, people have access to the experience of other, more experienced patients (Margherio, et. al., 1999). On the basis of such improved information, a patient may suggest methods and medical treatments other than those offered by his/her physicians. This is important because asymmetric information between physicians and patents about possible treatments has traditionally been regarded as a particularly serious obstacle to the development of a well-functioning market for health and medical services.

ICT also means that households get better information in the case of services provided by the public sector in several countries, such as schools, child care, and elderly care.

[8] See interesting speculations on issues such as these by Ian Pearson, /http://innovate.bt.com/viewpoints/pearson/

Households will have greater opportunities to express their views to the producers of such services; here, the *voice option* is strengthened. There may also be important consequences in the public sector for the *exit option*, which has traditionally been very weak because of the monopoly-like position of public service production in many countries. It is tempting to speculate that increased powers of customers in private markets will make households more aware of the importance of freedom of choice and the advantages of free entry and competition in the case of public services. Improved education will work in the same direction. As a result, both the voice and exit options would carry more weight in the future in the case of public-sector services.

The overall conclusion of this discussion is that ICT is likely to change the household time allocation in favor of home production and that here households will take over some tasks from firms, partly with help from firm-provided information systems. It is well known that tax distortions work in the same direction, because marginal tax rates favor (untaxed) home production relative to purchases in the market (financed by taxed income). But in these two cases (ICT-driven versus tax-driven changes), largely different types of goods and services will be influenced. High marginal tax rates have mainly stimulated household production in areas such as repairing and servicing of homes and durable consumer goods, cleaning, and gardening – where home production is a close substitute to purchases on the market. By contrast, the ICT revolution stimulates shifts to home production for other types of services such as banking, insurance, health services, reservations, booking and tickets. In this case, the shift to home production is caused not only by changes in relative costs, including the effects of tax wedges, but also by concern for convenience because ICT helps households to choose in a quite flexible way *when* to perform various tasks.

So far, we have mainly discussed situations when ICT empowers households to take over functions traditionally pursued by firms, i.e., the production of final services directly enjoyed by households. In other cases, individual households will provide *intermediary inputs* into firms' production processes. A celebrated example is when households, with support from ICT, enter the product design process, thus providing ideas and suggestions about various features of consumer products. More specifically, the new interactive technology implies that products may be made to the individual buyer's specification, often in a stepwise

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brands.htm.

procedure. Indeed, this type of co-production, known as mass customization, offers an opportunity to better adjust production to the desires of individual households through ICT support. Using their time and knowledge, households simply provide input into the firm's production process (households' supply type 2 information to firms) as illustrated by mass-customized products that appear in diverse areas such as cars, kitchens, CDs, and cosmetics. [9]

What will then be the new roles of firms in this new context? Of course one basic function is to develop and manage systems that enable households to pursue more or less complex production activities themselves. Firms help households improve the households' production technology, hence the $F_j(\cdot\cdot)$-functions. Because various labor-intensive activities will be reduced among firms, these are likely to cut their work force in certain labor-intensive activities that would be expected to accentuate the rate of structural change.

In other cases, ICT enables firms to perform tasks traditionally conducted by households. For example, firms may intervene in the household's search process. When a household has bought a specific product, the seller takes the initiative to offer the household another product that is likely to fit into the household's consumption pattern (a suitable q_i in the household's production process).

Consider when a consumer buys a book on the Web. If the Web site is interactive, i.e., connected to a database that accumulates data about Web visitors, it will register the sale. The next time the visitor enters the Web site, something else may be offered, e.g., an item that matches the revealed preference profile of the buyer (not necessarily another book, but perhaps a CD, a video, or a trip). In this way, the Web site automatically learns what this particular customer is interested in, and the firm develops an ability to offer additional products relevant for this particular customer. Here, the interactive Web site helps the customer find products with appropriate qualities, because everything that enters online media can be easily stored, searched for, and retrieved.

Right now, more and more support functions are being built into products or services through ICT. A customer may be told automatically on a screen what to do, e.g., when to check his tires or his blood pressure when he is a patient under medical treatment. Moreover,

[9] See e.g., Grönroos (1990); Gummesson (1991); Pine (1993); Davidow and Malone (1992); Wikström (1996).

when products malfunction, users may be automatically told what is wrong and what to do, for example, what spare part is needed, where it can be ordered, and how it should be inserted. More generally, when various durable consumer goods in the homes are connected with service suppliers, household members are relieved from anxieties and the pursuit of trivial tasks. All this implies that suppliers will provide support and take responsibility for parts of the household's production process.

If we look at further stages in the exchange process between households and firms, it is natural to assume that in some cases, the latter takes over the assembly and/or the delivery of products searched and purchased via electronic media – products that households traditionally transported from retail firms.

The relative market power of households and firms

The previous sections in this paper discussed how ICT empowers households to produce services and to cooperate with firms in the production process, for example, in the context of mass customization. But the *voice option* for households in consumer product markets will also become stronger because everything online is open and retrievable: comments on products and services are made in public, rather than in confidence. As a result, buyers can express their disapproval much more effectively than earlier. When buyers stand alone (hence not interacting with others), they may not know how well a product is supposed to function. They may think that the malfunctioning of a product that they purchased is simply due to improper use or bad luck. This is often the case with new and complex products. But when many buyers convey their experiences to others, they may soon find out that many others have had similar experiences. In addition, when many households express similar opinions in public, firms must take these opinions seriously and adjust their actions accordingly. These circumstances are also bound to increase the powers of households relative to firms in their *direct* relations.

But ICT will also have more *indirect* consequences for the market powers of households and firms. A useful starting point for a discussion of this issue is that the information among consumers is improved in three dimensions: the distribution of prices among sellers, how well available product varieties (assortments) fit individual households' preferences, and the quality of products supplied in the market

Better information about *prices* not only implies that households can buy at prices lower than before. Price competition will also increase, which means that some high-cost firms (production firms as well as retailing firms) lose sales and even go bust, while some low-cost firms will expand their sales. Competition will be accentuated by easier entry of low-cost firms, including small ones. One reason is that small firms will be more visible than before. In the traditional marketplace, prices announced by small firms have quite small effects on market prices because few buyers notice their prices. But prices announced by small firms on electronic media come up on the screen as easily and perhaps also as visibly as prices charged by larger firms, which helps small firms compete better with price. Moreover, it becomes easier for firms to enter markets with new operations based on outsourced production and with a strong focus on marketing. The reason for growth of this type of network organization is the fall in fixed costs in marketing when this occurs on electronic media, while the costs of entry in production (at least for many physical goods) are still high in many cases. With overcapacity in several production firms, outsourcing also becomes inexpensive because producers only have to cover their variable costs. So because of improved price information among households, their market powers will increase via several different channels.

The improved information among consumers about *product varieties* (assortments) will also have important consequences for the market powers of households relative to firms. Households can make better choices in the sense that they can find more product variety, which ensures a better fit with individual preferences (Bakos, 1997). This is distinctly to the advantage of households. But in the short run, the market powers of firms that supply differentiated products will increase in the sense that they can raise their prices when uncertainty recedes about how well product varieties fit individual preferences. Some of this price increase may be implemented in the context of the bundling of different goods into packages (Varian, 1997). So in the short run, improved information of product variety will favor households in one respect (wider choice) but firms in another respect (larger mark-up of price over cost).

While product variety is important for satisfying different individuals' specific needs, *product quality* refers to how well products meet well defined standards such as durability, reliability and types of material incorporated in the products. When households' information about product quality increases, high-quality firms can raise their prices or expand their sales

while low-quality firms have to accept price reductions or lower sales. This means that the "lemon problem" (Akerlof, 1970) will be mitigated in the sense that low-quality products will be less likely to drive out high-quality products and that high-quality producers can get prices that reflect their higher production costs compared to low-quality producers. In particular, firms with high costs relative to the quality of their products would be expected to be the losers.

But if there is free entry of firms, competition from new firms will drive down prices again for differentiated products in the long run, and consumers are likely to be the main winners in the process because consumers' surplus would be expected to increase relative to producers' surplus. This may also be regarded as a measure of the increased market powers of households relative to firms. Indeed, the limited empirical research that exists in this area is consistent with the hypothesis that most of the gains of electronic commerse, in the long run, will wind up in the form of higher consumers' surplus rather than higher producers' surplus. On the basis of this empirical evidence, Hitt and Bryhnjolfson (1994) characterize the consequences of ICT as a mechanism "creating value and destroying profits".

Counteractions by firms

But firms will not remain passive when competition increases and households gain increased markets powers in a long-term perspective. They would be predicted to increase the degree of differentiation of products and invest in product development. The previously mentioned opportunities for mass customization facilitate such counteractions by firms. As a result, the number of product varieties (assortments) would increase.

ICT makes it easier for firms to differentiate prices among different buyers, because firms will be better informed about important characteristics of these groups in terms of age, taste, income, shopping preferences, sensitivity to price, etc. (Shapiro and Varian, 1999; Brooke, 1992). While this tends to boost the profits of firms, there are also positive aspects of such price differentiation for low-income households, because it becomes possible for them to buy products from which they would otherwise be priced out of the market (Varian, 1998).

ICT will also have consequences for methods used by firms to assure households about the quality of products, and in this connection, to create and keep loyalty among buyers. In particular, we might hypothesize that *reputation* will become more important than before as

a method to create such assurance and loyalty. One reason is that positive and negative customer experiences tend to disseminate faster than before – due to ICT. As a result, reputation is likely to be gained and lost at a faster pace than earlier. The latter is particularly likely for small and/or new firms, because building reputation is a cumulative process. Small and/or new firms have a more limited amount of *reputation capital* on which to rely. One mistake may be enough to destroy their entire reputation and, if they try again, they must start with negative reputation capital. All this contrasts with large and well-known firms that can rely on accumulated reputation even if they fail once.

So in the electronic market, reputation will probably become more important than other well-known arrangements to protect consumers against bad product quality, such as warranties, contracts with penalty arrangements, and high prices as signals of quality. There is an additional explanation for this. Buyers are initially suspicious of products on the Internet because they cannot inspect them physically before making a purchase. Shopping in stores provides specific types of information about products, such as appearance, touch, and smell, which (so far at least) are difficult to experience on the Internet. Moreover, because there is no physical face-to-face contact on electronic media, which might contribute to trust in the seller, buyers who feel cheated are likely to lose confidence completely and withdraw. So in the case of electronic shopping, it is important for firms to acquire a good reputation at an early stage. The relevance of this point is indicated by several recent empirical studies.[10] It is becoming more important than before for firms to live up to their promises and to consumers' expectations.

Another type of counteraction of firms is to adjust their methods in *advertising*. When discussing this issue, it may be useful to make a conventional distinction between two aspects of advertising: substance information and persuasion. Substance information about prices, qualities, models, colors, services, and warranties will probably be largely provided by search agents in the same way, in principle, as in various types of printed consumer reports today. The advantage for the buyer is that the information enables comparison of qualities and prices of many different producers and that suppliers of this type of information often do not have an economic interest in the firms that produce or sell the products. So consumers inclined to

[10] See, for instance, Ahlbom and Andersson (1997); Helin and Skoog (1998); Bill and Swedmark (1998); and Hovstadius and Lundell (1998).

make rational choices, weighing benefits against costs of alternative products, will probably rely heavily on substance information provided by such information intermediaries.

ICT may also facilitate the use of marketing techniques that are designed to exaggerate quality differences and to reduce potential buyers' opportunities to compare prices. An example is highly differentiated price structures – reflecting not only a wide range of product varieties and qualities, but also restrictions on available options for prices in time and space.[11] Through such activities, suppliers may be able to counteract tendencies toward increased competition and reduced profit margins. Because information agents on the Internet can be expected to concentrate on substance information, product suppliers are likely to focus increasingly on image building and other types of persuasion. The contemporary literature on marketing emphasizes this aspect, illustrated by the often-quoted expression that "people don't buy a product, they buy an image".

As a result, we hypothesize that the market for information about consumer goods will become more segmented than before, with information intermediaries emphasizing information about availability of products and their qualities and prices, while firms are likely to concentrate more on persuasion and image building. Some buyers may then mainly choose substance information, while others may largely opt for persuasive information. In a similar way, a given individual may sometimes choose substance information but on other occasions be more open to persuasion.

Limitations and obstacles in the long run

We assumed at the start of this paper that various *transition problems* for electronic trade will be mitigated or even eliminated in the future. This includes the ready availability of highly structured information on the Web, safety of payments,[12] and adequate delivery systems

[11] Several techniques used by firms to achieve this have been discussed in the literature, for instance, in the airline industry (Bakos, 1997). Firms on the Internet may also try to hook buyers by providing appealing information about product quality but little information about prices, hoping that the household will become committed to the product before obtaining information about the price.

[12] Up to now, information provided by intermediaries on the Internet has usually been free for households, and the costs have been covered mainly by advertisements, i.e., banners. But to finance their activities in the future, information intermediaries may have to either start charging for their services or increase the amount of banners.

This financing has its problems. Visitors already complain about the many flickering banners that irritate them, which tends to diminish the attractiveness of the Web site. In principle, the information agent must find an optimum combination of a fixed access fee, a variable price per visit, prices for advertisements, and measures that increase the attraction of the Web site for visitors and

for physical products purchased via electronic trade. [13] Other obstacles and limitations will probably be more permanent. For example, households may find it difficult to see from where the search agents have collected their information, which means that it is difficult to evaluate the quality of the information. In fact, some of the information may be highly partisan without the households knowing it. There are also quality problems with the information acquired from new fora for consumer-to-consumer interaction – virtual communities and news and chat groups – largely because providers of information are often anonymous, which makes the quality highly uncertain.

Moreover, in the case of virtual communities and news ands chat groups, some individuals who provide information may just pretend to be experts and occasionally also supply false information. For instance, firms may pollute the information pool by disseminating information that is partisan in favor of their own company or provide negative information about competitors, pretending that households have supplied this information. Such partisan information, provided with a false identification of the sender, may be more misleading than partisan information openly supplied by firms, e.g., via advertisements. In other words, using this type of information requires a critical mind to distinguish between high-quality and low-quality information and, in particular, to screen out partisan, incorrect, and false information. But there are possibilities that consumer protection agencies set up systems (extranets) that protect fora participants and guarantee information quality through "membership," i.e., authorization, user IDs, passwords, firewalls, etc.

A related problem is how an individual should deal with the mass of complex information via electronic media and the vast number of available alternatives. So even if ICT facilitates information search and information processing, households will face a much more complex decision situation due to the many new alternatives and options. We are thus faced with limitations in the *cognitive capacity* of individuals. Even if younger generations (with arly experience of ICT) may be able to tackle these issues somewhat better than older generations,

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advertisers. Because there is no single best solution for everybody to this optimization problem, decentralized experimentation is likely to generate different types of solutions for different agents.

[13] The most obvious example of needed investment physical delivery systems is well-functioning systems for assembling and transporting physical products to households. We still have no way of knowing just what this new infrastructure will look like. In some cases, production firms, wholesalers, or retailers will deliver goods directly to homes or to institutions where individuals work. In other cases, products may be delivered to special places in the individuals' neighborhoods – to be picked up by buyers.

such obstacles are bound to continue. Some people may react to these difficulties by giving up their attempts to be *calculating agents* and instead become wide open to persuasion and image creation. Hence, attention to substance information may recede. This would give us a new illustration of Herbert Simon's old observation that a wealth of information creates a poverty of attention (Simon, 1997).

Another serious problem, which may very well be a permanent one, is that information and transactions via ICT systems is quite sensitive to fraud and economic crimes – possibly more so than traditional trading systems. A related problem is that it is vulnerable to sabotage; the deliberate spread of viruses via e-mail is one example.

Because of transition problems and permanent limitations of electronic trade, new structures for information and exchange will certainly live in parallel with old ones in a long-term perspective.

Concluding remarks

We have seen that the new information and communication technology (ICT) will change relations between households and firms in fundamental ways. In particular, changes will occur in their division of tasks and in their relative powers.

Increased information availability among households is reflected not only in a greater quantity of information but also in changes in *types* of information. Thanks to new types of information agents – search agents and consumer-to-consumer fora – the individual household may obtain information that is better structured than earlier to its specific needs. Moreover, the information obtained via these new agents is, in principle, independent of commercial interest among production firms and retailers.

The most characteristic feature of the new fora for consumer-to-consumer interaction is that the information comes from households that have direct experience of the products in question, which means that information refers to the functional quality of the products (in contrast to technical qualities emphasized by firms).

Not only will households get better information about available product and their prices (what we call type 1 information). They also learn how such products can best be used in the household's production of services with the help of purchased products and their time (what we call type 2 information). We also pointed out that households get information that

helps them enjoy consumption in new ways, hence changing their preferences as consumers. The improved information of households about products implies that the celebrated problems of asymmetric information and adverse selection are mitigated.

The most striking consequence for the division of tasks between households and firms is their new roles as producers. More specifically, the division of tasks between households and firms will change. First, ICT enables households to engage in the design of products adjusted to their individual desires, i.e., mass customization. Second, households take over the production of some services from firms, partly with help from firm-provided tools and systems and from other service providers. This holds for types of services that households have never been able to produce, such as financial and health services.

The driving force behind these changes in the division of tasks is changes in the relative efficiency of households and firms. The costs of performing certain tasks by households fall both in terms of money (lower costs of search and lower product prices) and in terms of time and energy. In several cases, when households take over production activities from firms, the costs will fall also for the firm, particularly for services such as financial and insurance services. So incentives to adopt the new information technology is very strong among households and firms.

The powers of households will change in two important respects. First, their market powers will increase because better information about available products and prices will result in wider selections for households and stiffer competition among firms. Both factors increase the exit option of households. Second, there is an increase in the direct powers of households in influencing firms. It not only becomes easier for individuals to express their views to firms. Households will also, as a group, exert direct influence on firms – thanks to the openness of information that accumulates in the context of the previously mentioned new fora for consumer-to-consumer interaction. So the voice option of households is strengthened.

There are several different ways for firms to counteract the loss of market powers to households. To protect their profits margins against stiffer competition, firms are likely to increase price and product differentiation, to take actions to make price comparisons more difficult, and to opt for marketing methods that emphasize persuasion – in contrast to what is often called substance information. Moreover, because of the new information systems,

reputation and loyalty become more important than before for firms, both when households buy goods and services and when they appear as partners in co-production.

It is obvious that the consequences of ICT for the division of tasks and the relative powers of households will differ considerably among different types of products. The consequences for *search* (information gathering) are important for tangibles as well as intangibles, which means that the relative powers of households increase for all types of products. It is commonplace that the consequences for *transactions* (purchases and payments) will be strongest in the case of intangibles, which we have illustrated with services such as banking, insurance, safety, health, and entertainment. So far, the expansion has mainly been confined to simple services. But in the future, much more complex services will probably be provided electronically, not only in the areas mentioned here but also in areas such as education and culture.

Regarding tangibles, we would expect that large volumes of transactions would develop mainly for homogenous products and for well-known brands. For *experience goods*, in some cases, households will make the search on the Web but inspect products in traditional stores and then complete the transaction electronically. Hence by exploiting free services in retailing, but in other respects side-stepping firms in this sector, retailing firms are bound to have problems in certain product areas, in particular in the case of expensive products for which prices differ a lot between traditional stores and firms that sell electronically.

Of course transactions will be conducted electronically only if there are no serious problems with the purchased-product deliveries. For several types of non-tangibles, no such problems arise because the deliveries take place electronically, or simply because households take over the production. For tangibles, an important role for electronic commerce requires that the delivery can be handled in a satisfactory way, which often presupposes heavy investment in inventory and transport systems.

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