Seminar Paper No. 670

**THE ICT REVOLUTION IN CONSUMER
PRODUCT MARKETS**

by

Assar Lindbeck and Solveig Wikström

INSTITUTE FOR INTERNATIONAL ECONOMIC STUDIES
Stockholm University

Seminar Paper No. 670

THE ICT REVOLUTION IN CONSUMER PRODUCT MARKETS

by

Assar Lindbeck and Solveig Wikström

Papers in the seminar series are also published on internet
in Adobe Acrobat (PDF) format.

Download from <http://www.iies.su.se/>

Seminar Papers are preliminary material circulated to
stimulate discussion and critical comment.

May 1999

Institute for International Economic Studies
S-106 91 Stockholm
Sweden

(edwikstB.doc)
AL/SW 99 05 06

Assar Lindbeck and Solveig Wikström:*

THE ICT REVOLUTION IN CONSUMER PRODUCT MARKETS

Abstract

New information and communication technology (ICT) makes consumers better informed about available products, product quality and prices, which mitigates problems of asymmetric information. The entry of firms is facilitated, competition and economic efficiency is boosted and the market powers of households increased. Firms are likely to respond by increased product and price differentiation. There will also be considerable changes in the division of tasks between firms and households. But important obstacles to these developments are technological vulnerability, quality problems in the information on the Internet, cognitive limitations of individuals and weaknesses in the product-delivery infrastructure in connection with Internet trade.

JEL D13, D40, D8, L1

Keywords: information technology, consumer goods markets, household production, competition, pricing, asymmetric information.

---

*Assar Lindbeck: Institute for International Economic Studies, Stockholm University, 106 91 Stockholm, Sweden and IUI Stockholm. Solveig Wikström: School of Business, Stockholm University, 106 91 Stockholm Sweden. We are grateful for useful comments on earlier drafts, in particular, by Bo Lennstrand, Christina Persson, David Strömberg and Alladi Venkatesh.

What are the consequences of the new information and communication technology (ICT) for the functioning of consumer product markets? This is the topic of the paper, which takes a broad view of the issue. Our discussion has four main theses.

1. The *market powers* of households will increase substantially due to better information and a strengthening of exit opportunities. Households' voice in the marketplace will also be strengthened, which means that firms' reputations will be more at stake than before.
2. Better information among economic agents and easier entry of firms result in *stiffer competition*, with higher efficiency of production and a more efficient allocation of tasks between firms and households.
3. Tendencies to reduced profit margins give firms incentives to opt for more *differentiation* of products and prices, and in some cases also more complex price systems. Firms are also likely to respond to the increased transparency of prices and product quality by a stronger emphasis in their marketing activities on persuasion and image building – since information intermediaries on the Internet give more comprehensive substance information.
4. In the near future the consequences of ICT will be much more important for the availability and exchange of *information* than for actual purchases of goods and services by the household sector. In the future, purchasing volumes on the Internet will probably be much larger when the electronic-commerce infrastructure improves, including more efficient delivery systems.

But before plunging into these issues, it is useful to summarize important ICT characteristics.

Information processing in consumer product markets

Our analysis is based on the assumption that recent trends in ICT will continue and that the technology will disseminate to a majority of households and firms. Our empirical illustrations of the role of ICT for consumer product markets will mainly be taken from two leading countries in terms of the diffusion of ICT, namely the US and Sweden.¹

---

¹ Forester Research predicts that Internet will be available to a majority of households in the US by 2000. They also predict that about one-third of households will be involved in Internet shopping already in 2002. In Sweden, Öhrings, Coopers & Lybrand (1998) predict that over 80 percent of households will make their ticket booking on the Internet in the near future, and about 70 percent in the case of durables and food.

Information and transaction flows differ considerably in the electronic market place as compared to traditional markets. Let us start with two general differences. First, in the electronic market place the entire transaction flow for intangibles can be handled over the Internet – information, payment and delivery. Second, the information flows will, to a considerable extent, change direction. In traditional markets, the sender largely takes the information initiative. On the Internet, consumers take the initiative.² But online information management can offer more specific benefits than these; some are summarized here:

- *Access to information is independent of time and place.* It is available when you need it and the entire accumulated stock of relevant information is available all the time, not just new offerings.
- *Information can be constantly updated at little extra cost.* Hence, tendencies to misinformation because of obsolescence of information are mitigated.
- *Information flows can easily be individualized.* By using the Web hypertext system, consumers can select and use just that part of the extensive information load that suits them. This leads to the paradoxical concept of individualized mass communication.
- *Information can be interactive without capacity constraints.* Customers can ask questions and get individualized computer-mediated answers.
- *ICT provides efficient channels for after-sales interaction.* Seller support at the consumption stage can be of decisive importance for the full use of product qualities.³

Because the issue of interactivity is central for our analysis, it is worth some further comments. By contrast to interaction via telephone, the communication process on the Internet has no capacity limits; an enormous number of interactions can occur simultaneously. Moreover, the interaction automatically creates new information and triggers responsive action from the database with which the household interacts. The process is limited only by the information availability in the database, which continually accumulates new information as a result of the interaction process itself.⁴

---

² Of course there are also plenty of cases when consumers take information initiatives in traditional markets, such as when they study different types of consumer reports, visit stores, etc.

³ Bill Gates (1999, p 113) states: “The majority of your [firm's] interaction with customers on the Internet will involve support rather than sales...”

⁴ For instance, consider the case when a consumer buys a book on the Web. If the Web site is interactive, i.e., connected to a database accumulating data about the Web visitors, it will also remember the sale. So next time the visitor enters the Web site something else may be offered, for instance, an item that matches the revealed preference profile of the buyer, not necessarily another book but perhaps a CD, a video or a journey. In this way, the Web site automatically learns to know what this particular customer is interested in, and the firm develops an ability to offer additional products relevant just for this customer. In this way, the interactive Web site helps the customer to find products with appropriate qualities, because everything that

The interactive communication process on the Internet includes “extended information search” with help from special search agents, each one with its own set of rules for how to index (classify), aggregate and disaggregate information. With the help of computer software programs, search agents offer highly structured information, hence performing the task of information intermediation. By using advanced search functions, agents monitor several “content sources” for information about products that match specifications made by subscribers. To make this possible, customers provide the agent with, for example, information about age, interests and data that indicate their preferences. From this information, the agent extracts a profile, or a “passport” that can be regarded as the customer's artificial representation. By searching for products that match the customer's profile, agents help consumers and other buyers to find goods and services in the market with a precision never before achieved.

A useful analytical framework

When analyzing the consequences of ICT for consumer product markets, it is helpful to rely on two different theory traditions in economics. We draw on abstract microeconomic theory and on the more concrete and structured theories in business economics. In the case of households, a useful unifying approach is to look upon the household as a *combination* of a “small firm” and a consumption unit, along the lines formulated by Gary Becker (1965), following a long but neglected tradition in economics.⁵ In traditional microeconomic theory, purchased market goods, q_i , enter as utility-creating entities in the household's preference function, $u(q_i)$. By contrast, in Becker's approach market goods (such as food products, apartments and sports equipment) are treated as intermediary goods which, in combination with time (t), are transformed into “final services”, s_j , by way of a household production function $s_j = F(q_i, t)$. These services (eating, drinking, consuming housing services, playing, etc.), rather than the market goods, then enter the household's preference function, $U(s_j)$, which is maximized with the household production function, household money income and available time as constraints.⁶

Becker's approach has several advantages when analyzing the consequences of the ICT revolution. Not only does it allow a distinction between the effects of ICT on the household's production and consumption activities. It also provides a useful framework

---

enters online media can be easily stored, searched for, and retrieved.

⁵ Reid (1934) and Cairncross (1958) made early contributions to this tradition.

for a discussion of changes in the division of tasks between households and firms, and of the interaction, including cooperation, between these two types of agents in the production and consumption processes.

Acquisition of information

It is useful to distinguish between two different types of information when considering the consequences of ICT for consumer product markets. One type is simply knowledge about available products, their qualities and prices. This type of information (type 1) helps firms and households to choose appropriate inputs and outputs in their production processes. A second type of information (type 2) may instead by itself be regarded as an (intangible) input in the production. In this case, the household uses an “information good” (i.e., a q_i in household production) to produce utility-creating services (s_j s in Becker’s framework). A clear example of the first type of information is a list of available CDs and their prices, while the *content* of the CD (for example, words, mathematics, or music) is an example of the second type of information, which you can get on the Internet.

The discussion in this section is confined to type 1 information, which is acquired either free or at a price in a market for information. (Subsequent sections discuss type 2 information.) Let us take a closer look at this market. In the case of consumer goods, markets for information have traditionally not been highly developed. One reason is that such information has often been erratic, old, misleading and (in the case of advertisement) biased in favor of the producers. Another reason is that information markets share some of the deficiencies with the product markets that they are supposed to serve. In the same way as consumers have difficulties evaluating the quality of products, they also find it difficult to evaluate the quality of information supplied about these products by sellers and information intermediaries. Imperfect information, including information asymmetries between suppliers and buyers, i.e., an unequal distribution of information between these two types of agents, create problems in both cases.

How will these features change by the emergence of ICT and various types of new information intermediaries, e.g., the previously mentioned search agents? With the support of the latter, consumers can more easily scan the set of available products and the prices charged by different dealers. A search agent may also help an individual organize a bidding process, i.e., an auction among a group of dealers. Search agents may

---

⁶ Becker uses the term “commodities” for what is here called “final services”.

alternatively help sellers find buyers, for instance, by organizing a bidding process (auction) among these.

Not only will the new information intermediaries help consumers find their ways through the ever-thicker information jungle. New fora, such as news groups and virtual communities, emerge for consumer-to-consumer interaction on the Internet. News groups are spontaneous networks of communicating consumers with common interests. Virtual communities are more tightly organized customer networks where the members interact systematically with each other and with suppliers of goods and services.

Let us take a closer look at the virtual communities. Even though many are initiated and organized by firms or at least sponsored by one or several firms, they often seem to function quite independently of the sponsors. (Hagel and Armstrong, 1997) They also provide and disseminate expert information even though information generated in the consumer-to-consumer dialogue is perhaps the single most characteristic feature of virtual communities.

Virtual communities and news groups give participants opportunities to compare and aggregate experiences, and this creates a large range of information and perspectives. Moreover, by contrast to transactions in traditional information markets, this exchange of information does not only occur between two agents, but also between one agent and an information pool to which many agents have contributed (Ghosh, 1998).

But what are then the incentives for individuals to share their experiences and knowledge with others? After all, an individual supplier of information to the pool is in the same situation as an individual who is supposed to contribute to the financing of a collective good. One possible reason for an individual to provide information to the pool is the satisfaction of sharing experiences and knowledge with others (Hagel and Armstrong 1997, Turkle 1995, Rheingold 1995). We would expect that this “social” motive plays a particularly important role when the individual has strong feelings about something (either enthusiasm or distinctly negative attitudes).

An additional reason to supply information to a pool on the Internet is to boost one’s own reputation or status – another example of a “social” motive. In a long-term perspective, it may occasionally also be possible to transform this reputation into economic returns, after the individual has become known for his knowledge. Thus, to supply free information on the Internet may to some extent be regarded as a private investment with an economic return in the future.⁷

---

⁷ A well-known example is the Linux system, which the innovator made available free of charge on the

While the incentives of households to share their information with others on the Internet probably mainly are of a social nature, the economic incentives for firms are more obvious. Not only will firms be better informed of how consumers perceive specific goods and services; they can also notice how households react when firms provide structured expert information.

The *quality* of the information generated by members of virtual communities and news groups is not necessarily “better” than information provided by experts, for instance in consumer reports, information given directly by firms or information provided by the search agents on the Internet. But it is a different, complementary type of information. The value is not just the experience and knowledge of some specific individual, such as a specialist, but experiences and perspectives of many individuals with different backgrounds. Thus, the value of this information is that it provides a broad cross-section of perspectives and experiences of individuals who have actually used the products. This type of information may be particularly useful for consumers entering a consumption area for the first time, because they may have particular difficulties knowing what kind of products and product characteristics to look for.⁸

A consequence is that certain households will be better informed than firms about the “functional quality” of products (by contrast to the technical quality). Indeed, a situation of “reverse” asymmetric information may arise in this respect until firms have learned from households. As a result, the problem of adverse selection should be mitigated.

Mitigation of imperfect information

The new information technology is also likely to influence traditional institutional arrangements to mitigate the consequences of imperfect information, including asymmetric information, and the related risk of adverse selection of products in the market place (the “lemon problem”), thin markets and even missing markets. We refer, of course, to *signaling* – in the form of warranties, contracts with penalty arrangements, and high price as an indicator of quality – and *reputation*. With increasing transactions on the

---

Internet. Subsequently, he may be able to enjoy economically favorable positions in the business community.

⁸ For instance, people who have recently become parents may have difficulties knowing which type of baby carriage they should choose, suitable for their specific situation, for example when they live in a flat in the center of a city with very little space to keep the carriage. These parents may not have friends or neighbors in the same situation. On the Internet, there is never any lack of advice from people with a similar background. Any reader may confirm this by a visit to a virtual community or a news group; see, for example, <http://www.parentplace.com>.

Internet, warranties will probably play a less important role than earlier as a signaling device.

One reason is that, to a greater extent than earlier, households will deal with sellers at distance, which means that enforcement of warranties may be difficult. The legal rules and institutions in the country of origin may also be quite different from the rules in the home country. When a buyer wants to make a warranty claim, the firm may even have disappeared. The small fixed investment for firms on the Internet also means low commitment to stay in the market, in particular, if fixed costs are partly “sunk”. These problems are more pronounced in the case of small firms, because the turnover of such firms will probably be particularly high. Indeed, the difficulty of providing credible warranties is one of the weakest points when it comes to transactions on the electronic market. The importance of contracts with penalty arrangements will also be expected to be smaller due to the enforcement difficulties and the uncertainty of how long the firm will stay in business.

To use a high price as a signal of high quality is also likely to lose much of its relevance. First, consumers will have better *general* knowledge about the relation between price and quality. Second, it becomes easier for consumers to assess the price/quality relation also in *specific* cases, partly by the help of search agents, news groups and virtual communities.

Reputation would instead be expected to become more important. Positive and negative customer experiences tend to disseminate faster than before — thanks to the Internet. As a result, reputation is likely to be gained faster, but also to be lost faster. The latter is particularly likely for small and new companies. The reason is that building reputation is a cumulative process. Small and new firms have a more limited amount of “reputation capital” to lean on. If they get into trouble just once, all the reputation may be lost, and when they try again they must start with a negative reputation capital. This contrasts to large and well-known firms that can rely on accumulated reputation even if they fail once.

Thus, in the electronic market, reputation will probably become more important than signaling via warranties, contracts with penalty arrangements, and high prices as signals of high quality. There is an additional explanation of this. Buyers are suspicious of products on the Internet already from the start, because they cannot inspect products physically before buying. Shopping in stores provides information about products, such as look, touch, and smell, which are difficult to get on the Internet. Moreover, buyers do not have much, if any, face-to-face contact that may provide trust toward the seller. So if buyers feel cheated in any way, they are likely to lose confidence completely and

withdraw. So in the case of Internet shopping, it is important to acquire a good reputation at an introductory stage and to keep it. This is indicated by several recent empirical studies.⁹

Of course, there is a possibility that several of the problems related to uncertainty about product quality and delivery via Internet trade may be mitigated in the future by new institutional arrangements. For instance, some search agents may start guaranteeing quality and delivery. Moreover, like sellers on the Internet, search agents and other intermediaries are anxious to build a reputation for themselves, hence also for the products they describe and recommend to consumers.

The efficiency of households and firms

What are then the consequences for the efficiency of households and firms of the drastically increased availability of information? Let us start with the household. First, better information among households about available goods for household's production (information of type 1) makes it easier to choose an appropriate q_i . Second, the availability of better information goods as inputs (information of type 2) contribute to increased efficiency in household production. As a result, the household becomes more efficient in producing "final" utility-creating services (the s_j 's). Households will also get lower prices because they have a larger number of suppliers to choose from when they scan local and global markets more efficiently, partly with assistance from the previously mentioned search agents. For instance, 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.

By interaction on the Internet with other households, individual households may also learn to *evaluate* final services differently. When they find out more about other individuals' preferences this may help them develop their own preferences (the $U(s_j)$). After all, preferences are partly social phenomena, in the sense that they are formed in the context of social interaction among individuals.¹⁰

---

⁹ See, for instance, Ahlbom and Andersson, 1997; Helin and Skoog, 1998; Bill and Swedmark, 1998; Hovstadius and Lundell, 1998.

¹⁰ Take the case when an individual decides to buy a camera. Via the Internet he gets better information about the quality and price of different types of cameras and other photo equipment (the q_i 's in the production function). By joining a virtual community formed around photography, he gets advice (beside information given by the supplier) on how the camera equipment actually performs (thus advice about the choice of an efficient $F(\cdot)$ function). For example, the buyer may get information about weak (strong) points of the product as seen from the user's viewpoint and how to handle these weaknesses (strengths). Moreover,

So far the efficiency issues have been seen mainly from the household's viewpoint. But the structure and efficiency of firms is also likely to be influenced by ICT, with important consequences for households. For example, it becomes easier for firms to enter markets with a new business that is based on outsourced production and with a strong focus on marketing. The reason for the growth of this type of network organization is the fall in fixed costs in marketing while the costs of entry in production are still high in many cases. With overcapacity in several production firms, outsourcing becomes inexpensive because the producers only have to cover their variable costs. All this means that competition from new actors is likely to increase and profit margins to be threatened. At the same time as individual firms will suffer from increased competition, we would expect the efficiency of the sector of firms as a whole to increase.

The importance of small firms for price formation also tends to increase. In the traditional marketplace, price changes by small firms have quite small effects on market prices because few buyers will notice their price changes. But prices announced by small firms on the Internet come up on the screen as easily and perhaps also as visibly as prices charged by larger firms. This not only helps small firms compete better with price. It also helps consumers find the lowest possible price.

The consequences of better information among households are likely to be quite different in the case of homogenous and heterogeneous goods, respectively. In the case of homogenous products, it is natural to assume that individual firms are able to set different prices for identical products because of imperfect price information among consumers. Lower search costs among households as a result of ICT would intuitively be expected to result in stiffer competition among firms, lower profit margins (reduced mark-up of price over costs), and a more narrow price dispersion among firms. We would also expect a reduction in the number of firms due to failures among the least efficient ones. But lower entry costs would be expected to counteract the latter tendency, which makes the net effect of ICT on the number of firms ambiguous. Indeed, all these predictions may be derived from a simple model with profit-maximizing firms, utility-maximizing households and explicitly modeled uncertainty about the prices charged by individual firms; see Lindbeck and Strömberg (1999). Households would gain both because it becomes easier to find low-price sellers and because average costs of production falls when the least efficient firms leave the market.

---

by seeing pictures taken by others and by learning to take good pictures himself, he starts appreciating photos more than earlier; hence his $U(s_j)$ function will also change. A combined effect of all this is that he

In the case of heterogeneous products, we would expect changes not only in prices and profit margins but also in the composition of the set of products. The background is that uncertainty recedes, about how well different product varieties (brands) match individual preferences. Since the differences between different products become clearer for households, firms will be able to raise their prices and mark-ups. But when new firms enter, profit margins will be squeezed and consumers will enjoy larger product variety. Thus, with free entry consumers' welfare tends to increase. These predictions may be derived from a model with explicitly modelled uncertainty among households about product quality (Lindbeck and Strömberg (1999); see also Bakos (1997). We would also expect that some low-quality products would be phased out when ICT increases the information among households about product quality. This illustrates our earlier point that ICT is likely to reduce problems of adverse selection.

The limited empirical research that exists in this area is consistent with the hypothesis that productivity will be boosted, and that the main gains tend to wind up in the form of higher consumers' surplus rather than higher producers' surplus; see Hitt and Brynjolfsson (1994) ¹¹

The distribution of power

Improved information among consumers, stiffer competition among firms and a more important role of reputation make households more powerful. The most obvious example is perhaps greater possibilities to choose among different products and different suppliers and to abandon products that the household does not like: i.e., the "exit-option" is strengthened. The earlier mentioned rise in consumers' surplus relative to producers' surplus also reflect increased consumer power.

But the voice function of buyers also becomes stronger. When buyers stand alone (hence without interaction with others), they may not know how well a product will function. They may think that the malfunctioning of a product, which they purchased, is simply a result of an improper use of the product. This may often be the case with many new complex products. But when individual buyers convey their problems to others on the Internet, they may soon find out that others have similar experiences. Because everything online is open and retrievable, comments on products and services are made in public, rather than in confidence. So buyers can express their disapproval much more

---

becomes a keen photographer and devotes more spending and more time than earlier on this activity.

¹¹ Hitt and Brynjolfsson (1994) characterize the consequences of ICT as a mechanism "creating value and

effectively than earlier. As a consequence of the increased importance of electronic market places, the reputation of firms and product brands is continuously at stake – a threat that many producers are aware of.

The stronger voice of households is likely to be particularly important for products and services with great significance for the “quality of life”, such as health. From the Internet, knowledge-seeking patients can get the latest findings about the nature of diseases, treatments, medical care and new pharmaceuticals. Moreover, through virtual communities and other types of networks, patients have access to the experience of other, more knowledgeable patients. (Margherio, 1999)

On the basis of such improved information, patients may suggest other methods and medical treatments than those offered by their physicians. This is important, as asymmetric information 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.¹²

It is likely that the voice option will be strengthened also in other services provided by the public sector, such as schools, child and elderly care simply because the costs of expressing voice falls. The exit option has traditionally been very weak in the case of public-sector services because of the monopoly-like position of public institutions in several countries. But it is tempting to speculate that the 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 also in the case of public services. The better education of the customers will work in the same direction. For these various reasons, it is likely that the voice and the exit option will gain increased importance in the future in the case of public-sector services as well.

Division of tasks between households and firms

We argued earlier that ICT is likely to enhance the efficiency of the production activity of households and firms. We would also expect induced changes in the division of tasks between these two types of agents in response to changes in their relative efficiency (comparative advantage).

---

destroying profits”.

¹² This development is illustrated by English general practitioners who have recently experienced that their patients increasingly want to discuss alternative treatments with the general practitioners. Studies indicate that the latter expect that time devoted to consulting with the patients will increase from 7 to 15 minutes, as an average, within 2-5 years (Editorial in the *English Medical Journal*, 1997).

Let us start with cases when households take over function from firms. One case is when households become co-producers with firms.¹³ A frequently mentioned example is that individual households, with the support of ICT, enter the product design process, thereby providing inputs in the form of ideas and suggestions about the character and variety of products. More specifically, the new interactive technology means that products may be made to the individual buyer's specification, often in a stepwise procedure. Indeed, this type of co-production, known as mass-customization, offers an opportunity to adjust production better to the desires of individual households through IT support. Households simply make inputs in the firm's production process in the form of their own time and their knowledge, households supply type 2 information to firms. Mass-customized consumer products appear in a vast variety of product areas, from cars and kitchens to CDs and cosmetics.

The co-production process is pushed further when firms provide tools and systems that enable households to produce their own services more efficiently than before. In Becker's terminology, firms help households to improve the latter's production processes (a better $F(\cdot)$ function) and to provide new inputs (new $q_i:s$) in these processes. One illustrative example is when households produce their own financial services, including the payments of bills, transactions of deposits and loans and the management of financial assets such as shares and bonds. In these cases, transactions on the Internet mean, in fact, that households are involved in the production of financial services.¹⁴ Fast developments of transactions on the Internet are on the way also in insurance, where households partly take over production activities earlier pursued by insurance brokers and salesmen, i.e., "middlemen".¹⁵

Other areas where households take over production rapidly are ticket-bookings of various types, in particular, travel and entertainment but also hotel booking. As in the case of bank and insurance services, this means that households integrate retailing in their production activities. In the case of traveling tickets, online sales have few organizational

---

¹³ See, for instance, Grönroos, 1990; Gummesson, 1991; Pine, 1993; Davidow and Malone, 1992; Wikström, 1996.

¹⁴ The driving force is not only increased convenience but also changes in relative efficiency of production by households and firms, reflected in extremely low operating costs when using the Internet – a cent to conduct a transaction as compared to more than a dollar if handled by a teller at a branch bank (Booz-Allen and Hamilton 1996, in Reddman 1997). Informed observers expect that customers in the US already before the end of the millenium are likely to do most of their banking transactions on the Web (Secretariat on Electronic Commerce, 1998).

¹⁵ Some analysts project that by 2001, insurance premiums generated on the Internet will have increased with a multiple of 200 to 300 as compared to 1997 (Forester Research, in Secretariat on Electronic Commerce, 1998).

constrains, perhaps because computer reservations systems have been in place for years.¹⁶

An example of co-production from the health sector is the fast-expanding system for self-care, which in some cases replaces hospital care. More and more therapies can be applied in the patient's home, with the support of ICT (Bezold, 1998). Consider, e.g., the case with asthma and diabetes patients. In the future, they may to a considerable extent be co-producers of their own treatment. For instance, they may check their conditions, register the effects of different treatments and decide part of the medication, while experts at the hospital take on a monitoring and counseling role online.

In *physical-product retailing*, households take over production activities much more slowly. But some movements have occurred in this direction. Some products are already purchased in considerable volumes on the Internet such as cars, electronics, cameras, books, appliances, luggage, perfume, flowers and gifts, computer hardware and software, and video games. (Secretariat on Electronic Commerce, 1998).¹⁷ In other cases the decisions to purchase seem to be made increasingly on the basis of information obtained from the Internet, while the actual purchase agreement usually continues to be made from traditional retailers.

So far, we have mainly discussed examples when ICT helps households take over functions traditionally pursued by firms. In other cases, ICT enables firms to take over tasks traditionally conducted by households. Firms may in some cases take over the assembly and in other cases also the delivery of products ordered from the Internet – products that households earlier collected at and transported from retail firms.

Various support functions may also be built into the products or services themselves with the help of ICT. The user may be told automatically on a screen what to do, e.g., when to check the tires of the car or the blood pressure of a patient under medication. Moreover, when products malfunction, the user may be automatically told on a screen what is wrong and what to do. For example, what spare part is needed and where it can be ordered, and finally how it can be plugged in. These examples show how products and services, with the support of ICT, are increasingly loaded with user support

---

¹⁶ The cost is much lower for a ticket directly sold electronically by the airline than through an agent. Estimates suggest that the difference is about USD 7 (USD 1 instead of 8) to process a ticket. (Air Transport Association of America, 1997)

¹⁷ The Sedant Corporation, a USD 5.3 billion consumer goods and services company, offers more than one million products and services on its Web site. The company claims that its supply satisfies 20% of an average family's shopping needs. Before the decade ends, Sedant plans to offer a selection of products that will cover more than 95% of the products bought by a typical household.

provided by the producer. This implies that suppliers take responsibility for parts of the household's own-production process.

Towards increased differentiation and persuasion

Firms will not sit still when they experience growing consumer power, increased competition and falling profit margins. One likely response is that firms accentuate price and product differentiation. Indeed, ICT makes it easier for firms to differentiate prices among different buyers, because firms will be better informed about important characteristics of these in terms of age, taste, income, shopping behavior, sensitivity to price, etc; see Varian and Shapiro (1998); and Brooke (1992). One way of doing this is to differentiate prices in the context of the previously mentioned mass customization – a type of product differentiation that ICT facilitates. Moreover, in the case of information goods, price differentiation may be implemented in the context of “bundling” of different goods into packages (Varian, 1997). Price differentiation not only boosts profits and reduces consumers' surplus. It also has positive aspects for households. It becomes possible to obtain products for buyers who would be priced out of the market if prices are not differentiated. This would be favorable for economic efficiency in consumer goods markets (Varian, 1998).

How will all this influence marketing and advertising? When discussing these issues, it may be useful to make a conventional distinction between two aspects: substance information and persuasion. When it comes to substance information about prices, qualities, models, colors, services, and warranties, this is likely to be largely provided by information intermediaries on the Internet, in the same way, in principle, as in various types of printed consumer reports today. In both cases, the advantage for the buyers is that the information provides comparison of qualities and prices of many different producers. Thus, consumers inclined to make “rational” choices, weighing benefits against costs of alternative products, will probably rely heavily on substance information provided by search agents.

But ICT may also facilitate marketing techniques that are designed to exaggerate quality differences and to reduce the possibilities of potential buyers to compare prices. By such actions, suppliers could counteract tendencies to increased competition and reduced profit margins.¹⁸ Because information agents on the Internet would be expected

---

¹⁸ Several techniques of firms to achieve this have been discussed in the literature (Bakos, 1997). One is to develop complicated price systems (such as in the case of the airline industry). Another technique is that

to concentrate on substance information, suppliers of products are themselves likely to concentrate 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, the market for information about consumer goods will probably become more segmented than earlier, with information intermediaries emphasizing information about the availability of products and their qualities and prices, while firms are likely to concentrate more on persuasion and image building. This may not be bad for consumers. Some may 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 at other occasions be more open to persuasion.

ICT also makes it easier and less expensive for various service firms, such as hotels, restaurants and airlines to change prices in response to changing circumstances, e.g., by charging different prices different days of the year. So “menu costs” of price changes fall. It becomes easier for firms to inform potential customers about price reductions, which means that the well-known “kinks” in the demand curves, due to imperfect price information, tend to disappear.

As a result, we would expect an increase in overall price flexibility, which is bound to have macroeconomic consequences. The emergence of output effects of shifts in aggregate product demand is often asserted to be the result of a sluggish response of product prices to aggregate demand shocks. This notion is a central feature of *new-Keynesian* macroeconomics. But due to ICT, shifts in aggregate product demand would be expected to have stronger effects on prices and the rate of inflation in the future, and hence smaller effects on aggregate output. This would make aggregate demand management a more useful method than earlier to influence inflation — but a less useful method to influence aggregate output.

Limitations and obstacles to the ICT revolution

What are the main limitations and obstacles to the ICT revolution in consumer product markets? Some limitations reflect transition problems while others are of a more permanent nature.

One difficulty is limitations in the information technology itself, such as long

---

firms on the Internet try to “hook” buyers by providing appealing information about product quality but little information about prices, hoping that the household has become committed to the product before it gets

waiting times on the Internet, breaks in connections, and similar technical problems. Another difficulty is bad applications of the technology, including poorly designed and managed sites and complicated search procedures. Much of this probably reflects transition problems that will be solved within a few years. The same holds for the development of efficient and safe payment systems. But up to now, limitations in these systems have certainly been an important obstacle to transactions on the Internet.

Another serious problem, which may be more long lasting, is that ICT systems seem quite sensitive to fraud, such as economic crimes – possibly more so than traditional trading systems. A related problem is that systems are vulnerable to sabotage. A well-known illustration is the deliberate spread of viruses via e-mail.

There are also serious problems with the quality of the information on the Internet. In the case of virtual communities and news groups, some individuals who provide information on the Internet may simply just pretend to be experts. They may occasionally also supply false information. For instance, firms may pollute the information pool by supplying 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., in advertisements. So to use information on the Internet requires a critical mind to distinguish high-quality and low-quality information, in particular, to screen out incorrect and false information.

A related problem is how the individual should be able to deal with the mass of complex information on the Internet, with the vast number of available alternatives. Thus, even if ICT facilitates information search and information processing, households will face a much more complex decision situation with many new alternatives and options. So we are faced with limitations in the *cognitive capacity* of individuals.

A special aspect of cognitive limitations is related to the emergence of a more differentiated price structure – reflecting not only in variations in product quality but also in various restrictions on available purchases in time and place. While this makes information richer, it also becomes more complex to deal with for the individual. Even if younger generations may be able to deal with these issues somewhat better than older generations, these obstacles are bound to continue. There is a possibility

that some individuals react to these difficulties by capitulation in their roles as “calculating agents” relying on factual information, and instead become wide open to persuasion and image creation. Hence the attention to substance information may recede. And we would get a new illustration to Herbert Simon’s old observation: “a wealth of information creates a poverty of attention” (Simon, 1997).

The pricing of information provided by information intermediaries on the Internet is another problem; see, e.g., Shapiro and Varian (1999) and the US Department of Commerce (1998). Up till now, such information (what we earlier called information type 1) has usually been free for households, and the cost for the agents have mainly been covered by advertisements, i.e., banners. But to finance their activities in the future, information intermediaries may have either to start charging for their services or to increase the amount of banners.

One reason why information intermediaries usually do not charge is strategic. They have an interest in many visitors to generate large advertising revenues. The strategy is the same as for freely distributed newspapers financed by advertisements. This is an application of a very general strategy among firms: to supply a product free of charge and to receive revenues later on from complementary products to the freely supplied one (Brian, 1996).

But to finance information intermediaries on the Internet via advertisement (banners) is also connected with problems. Already now, visitors complain about the many flickering banners that irritate them, which tend to reduce the number of visitors, hence diminishing 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 advertisers. Because there is no best solution to this optimization problem, decentralized experimentation is likely to generate different types of solutions for different agents.¹⁹

Even though these various obstacles may slow down the expansion of Internet trade, the main obstacle is the lack of efficient delivery systems, in particular, for physical products. This can be overcome only by huge, costly, time-consuming investments in infrastructure. The most obvious example is the need for conveniently located places to pick up products and well-functioning systems for the transport of

---

¹⁹ The Internet is also a collective good with related potential pricing problems. But we do not deal with these problems in this paper.

physical products to households. In particular, it is expensive to make small deliveries from each firm to each separate household, which historically explains why wholesaling and retailing have developed over the years. It is not possible to be confident today just what the new infrastructure will look like. In some cases, production firms, wholesalers, or retailers will deliver goods directly to the homes or to the institutions where individuals work. In other cases they may deliver products to special places in the individuals' neighborhoods, where the individual can pick them up himself, etc.

Summary: consequences for consumer product markets

In principle, the market system has the potential to function more efficiently when, thanks to ICT, consumers become better informed about available products, product variety, quality and prices, and when firms will be better informed about consumer needs and desires. Consumers can also choose from a much larger and more varied market than before, more independent of time and place. Another consequence is that competition among firms will increase – in terms of quality and price. The price dispersion of homogenous products would be expected to become considerably more narrow, and the likelihood of high-quality products to survive will increase as compared to low-quality products. As a result of all this, the market powers of households are enhanced – in terms of easier exit as well as stronger voice.

Due to easier entry via the Internet, small firms are likely to be favored by the new development, though the difficulties to build reputation for such firms may be a problem. As explained above, we would expect that prices would be more flexible than before in response to shifts in demand and supply, which is likely to reduce the volume response relative to the price response to aggregate supply and demand shocks.

We argue that asymmetric information between firms and households about product quality will be mitigated and that adverse selection and tendencies to thin markets and missing markets will be a less serious problem. We also argue that reputation will be a more important device than earlier to mitigate these problems.

All this means that markets are likely to come closer to perfect-information markets and even to markets with perfect competition. The efficiency of the sector of firms would be expected to increase as a result. It is also tempting to speculate that an individual operating on the Internet in her home or workplace will make more “rational” choices than today, in the sense of basing purchase decision on systematic comparisons of alternatives obtained from information intermediaries, virtual communities and news

groups. In this sense, “economic man” may make a comeback. Better-informed households will also be able to produce utility-enhancing services more efficiently.

But it is likely that sellers will react to these changes by increased product and price differentiation and persuasive and image-creating messages. As we argued earlier, the market for information about consumer goods will probably become more segmented than earlier, with information intermediaries emphasizing substance information and firms concentrating more on persuasion and image building. Consumer-to-consumer interaction on the Internet is also likely to influence consumer preferences because these are partly the result of “social interaction”.

So we argue that the ICT revolution is likely to result in stiffer competition, increased consumer power, higher efficiency, and more differentiation of prices and products. But we emphasize that there are many serious obstacles and delays to the ICT revolution in consumer product markets. Even though the technical development of ICT is still only in its infancy, as compared to its potential, refinements take time. Moreover, the technology may continue to be sensitive to disturbances even when it becomes more highly developed. Because information flows on the Internet are non-monitored and unregulated, its uneven quality will probably continue to be a serious problem. Though most pricing and payment problems are likely to be solved, fraud and economic crimes in general are bound to continue. Moreover, despite the easy access to structured information, the huge increase in options for agents will always make cognitive limitations of individuals a main obstacle to ICT performance.

It is also obvious that heavy, time-consuming investments are required to create logistic systems for delivery of products to consumers. In the same way as it took decades before electricity could be delivered to most homes, it will take a long time before Internet trade of consumer goods will reach volumes comparable with the volumes in traditional trade in consumer goods. So in the foreseeable future, the new structures will live in parallel with the old ones. They will serve as complements in some cases and as substitutes in others.

References

- Ahlbom, A. and A. Andersson, 1997, Internethandeln ur konsumentens perspektiv, , Masters theses, School of Business, Stockholm university.
- Bakos, Y. S., 1997, "Reducing Buyer Search Costs: Implications for Electronic marketplaces", *Management Science* 43(2), December, pp. ... - ...
- Bettman, J.R., 1979, Information Processing Theory of Consumer Choice. Addison-Wesley Publishing, Reading, MA.
- Becker, G., 1965, "A Theory of the allocation of Time", *The Economic Journal*, September , 493-517.
- Bezold, C. 1998, "Tools for Better Decision-making," in C. Bezold, J. Frenk and S. McCarthy (eds), *Prospects for Achieving Health for All*. Where??? Institute for Alternative Futures. Pp.???
- Bill, C. and M. Swedmark, 1998, servic@weben, Masters theses, School of Business, Stockholm university.
- Brian, A. W., 1996, "Increasing Returns and the New World of Business", Harvard Business Review, July/August, 74(4).
- Brooke, G. M. (1992), "The Economics of Information Technology: Explaining the Productivity Paradox", MTI Sloan School of Management CISR Working Paper no 238.
- Cairncross, 1958, "Economic Schizophrenia", *Scottish Journal of Political Economy*, February.
- Forester Research, 1999, *Talking point*, www.forester.com/ER/Press/Talking/0,1377,0,FF.html
- Fölster, S and J. Pettersson, 1999, *Vad kostar en limpa på nätet – så kan Internethandeln pressa priser* (What is the price of a loaf of bread on the Internet – how the Internet-trade can squeeze prices). Forskningsrapport S41, Stockholm: Handelns Utredningsinstitut..
- Gates, B., 1999, *Business @ the Speed of Thought*, Harmondsworth: Penguin Books
- Ghosh, R., 1998, "Cooking pot markets: an economic model for the trade in free goods and services on the Internet", *Brazilian Electronic Journal of Economics*, beje.decon.ufpe.br/ghosh/cooking.htm

- Grönroos, C., 1990, *Service Management and Marketing. Managing the Moments of Truth in Service Competition*. Lexington Books, Toronto.
- Gummesson, E., 1991, *Kvalitetsstyrning i Tjänste- och Serviceverksamheter*, (Quality Control in Service Businesses), CTF, Högskolan i Karlstad.
- Hagel, J. and Armstrong, A.G., 1997, *Net Gain*, Harvard Business School Press, Boston, MA.
- Helin, J. and A.C. Skoog, 1998, *Internet, nytt medium, nytt betende*, Masters theses, School of Business, Stockholm university.
- Hitt, L. and Brynjolfsson, E., 1994, "Creating Value and Destroying Profits", <http://ccs.mit.edu/CCSP183.html>
- Kotler, Philip, 1996, *Marketing Management*. Prentice Hall, London.
- Lindbeck A. and D. Strömberg, 1999, "Consequences for Pricing and Product Variety of Lower Costs of Search and Entry", manus.
- Lundell, C. and E. Hovstadius, 1998, *Mat. Nödvändighet eller upplevelse - en jämförelse mellan att handla på internet eller butik*. Masters theses, School of Business, Stockholm university.
- Margherio, L., Henry, D., Cooke, S., Montes, S., (1999) *The Emerging Digital Economy*, Secretariat on Electronic Commerce, Washington D.C.:US. Department of Commerce
- Michael, Robert and Gary Becker, 1973, "On the New Theory of Consumer Behavior", *Swedish Journal of Economics*.
- Perloff, J.M. and Salop, S.C., 1985, "Equilibrium with Product Differentiation", *Review of Economic Studies*, 52, pp. 107 - 120.
- Pine, B.J. II, 1993, *Mass Customization*. New Frontiers in Business Competitions, Harvard Business School Press, Cambridge, MA.
- Redman, R., 1997, "Sweeping the Appeal of ATMs", *Bank System & Technology*, November, p 38 aa.
- Reid, M. B., 1934, *Economics of Household Production*, New York, Wiley.
- Rheingold, H., 1995, *The Virtual Community. Surfing the Internet*, Minerva.
- Simon, Herbert, 1997, "Designing Organizations for an Information-Rich World", in Donald M. Lambertson, ed., *The Economics of Communication and Information*, Cheltenham, U.K.: Edward Elgar.
- Shapiro, C. and H.R. Varian, 1999, *Information Rules*, Harvard Business School Press, Boston, MA.

- Stiglitz, J. E., 1989, "Imperfect Information in the Product Market", in *Handbook of Industrial Organization*, R. Schmalensee and R.D. Willis (eds.) New York: North-Holland.
- Turkle, S., 1995, *Life on the Screen: Indentry in the Age of the Internet*, Simon and Schuster, New York.
- US Department of Commerce, 1998, *The Emerging Digital Economy*, Washington D.C.
- Varian, H. R., 1997, "Versioning Information Goods", in *Digital Information and Intellectual Property*, Harvard Univeristy Press.
- , 1998, "Differential Pricing and Efficiency", *Firstmonday, Peer-reviewed Journal of the Internet*, March 12.
- Wikström, S. (1996), The Customer as Co-Producer. *European Journal of Marketing*, Volume 30, No 4.
- Öhrlings Coopers & Lybrand, *The Internet Market in Sweden*, September 1998.

SEMINAR PAPER SERIES

The Series was initiated in 1971. For a complete list of Seminar Papers, please contact the Institute.

1996

616. *Assar Lindbeck:* The West European Employment Problem. 31 pp.
617. *Assar Lindbeck:* Full Employment and the Welfare State. 22 pp.
618. *Javier Ortega:* How (Good) Immigration Is: A Matching Analysis. 30 pp.
619. *Joakim Persson and Bo Malmberg:* Human Capital, Demographics and Growth Across the US States 1920-1990. 21 pp.
620. *Assar Lindbeck and Dennis J. Snower:* Centralized Bargaining, Multi-Tasking, and Work Incentives. 43 pp.
621. *Paul Söderlind and Lars E.O. Svensson:* New Techniques to Extract Market Expectations from Financial Instruments. 47 pp.

1997

622. *Assar Lindbeck:* Incentives and Social Norms in Household Behavior. 12 pp.
623. *John Hassler and José Vicente Rodriguez Mora:* Employment Turnover and Unemployment Insurance. 36 pp.
624. *Nils-Petter Lagerlöf:* Strategic Saving and Non-Negative Gifts. 20 pp.
625. *Lars E.O. Svensson:* Inflation Targeting: Some Extensions. 43 pp.
626. *James E. Anderson:* Revenue Neutral Trade Reform with Many Households, Quotas and Tariffs. 36 pp.
627. *Mårten Blix:* Rational Expectations in a VAR with Markov Switching. 37 pp.
628. *Assar Lindbeck and Dennis J. Snower:* The Division of Labor Within Firms. 12 pp.
629. *Etienne Wasmer:* Can Labour Supply Explain the Rise in Unemployment and Inter-Group Wage Inequality in the OECD? 64 pp.
630. *Torsten Persson and* Political Economics and Macroeconomic Policy. 100 pp.

Guido Tabellini:

631. *John Hassler and Assar Lindbeck:* Intergenerational Risk Sharing, Stability and Optimality of Alternative Pension Systems. 38 pp.
632. *Michael Woodford:* Doing Without Money: Controlling Inflation in a Post-Monetary World. 62 pp.
633. *Torsten Persson, Gérard Roland and Guido Tabellini:* Comparative Politics and Public Finance. 55 pp.
634. *Johan Stennek:* Coordination in Oligopoly. 14 pp.

1998

635. *John Hassler and José V. Rodríguez Mora:* IQ, Social Mobility and Growth. 34 pp.
636. *Jon Faust and Lars E. O. Svensson:* Transparency and Credibility: Monetary Policy with Unobservable Goals. 40 pp.
637. *Glenn D. Rudebusch and Lars E. O. Svensson:* Policy Rules for Inflation Targeting. 51 pp.
638. *Lars E. O. Svensson:* Open-Economy Inflation Targeting. 51 pp.
639. *Lars Calmfors:* Unemployment, Labour-Market Reform and Monetary Union. 35 pp
640. *Assar Lindbeck:* Swedish Lessons for Post-Socialist Countries. 37 pp.
641. *Donald Brash:* Inflation Targeting in New Zealand: Experience and Practice. 11 pp.
642. *Claes Berg and Lars Jonung:* Pioneering Price Level Targeting: The Swedish Experience 1931-1937. 50 pp.
643. *Jürgen von Hagen:* Money Growth Targeting. 34 pp.
644. *Bennett T. McCallum and Edward Nelson:* Nominal Income Targeting in an Open-Economy Optimizing Model. 48 pp.
645. *Assar Lindbeck:* Swedish Lessons for Post-Socialist Countries. 42 pp.
646. *Lars E.O. Svensson:* Inflation Targeting as a Monetary Policy Rule. 51 pp.

647. *Jonas Agell and Mats Persson:* Tax Arbitrage and Labor Supply. 35 pp.
648. *Frederic S. Mishkin:* International Experiences With Different Monetary Policy Regimes. 47 pp.
649. *John B. Taylor:* The Robustness and Efficiency of Monetary Policy Rules as Guidelines for Interest Rate Setting by The European Central Bank. 39 pp.
650. *Christopher J. Erceg, Dale W. Henderson and Andrew T. Levin:* Tradeoffs Between Inflation and Output-Gap Variances in an Optimizing-Agent Model. 43 pp.
651. *Etienne Wasmer:* Labor Supply Dynamics, Unemployment and Human Capital Investments. 36 pp.
652. *Daron Acemoglu and Fabrizio Zilibotti:* Information Accumulation in Development. 43 pp.
653. *Argia Sbordone:* Prices and Unit Labor Costs: A New Test of Price Stickiness. 33 pp.
654. *Martin Flodén and Jesper Lindé:* Idiosyncratic Risk in the U.S. and Sweden: Is there a Role for Government Insurance? 30 pp.
655. *Thomas P. Tangerås:* On the Role of Public Opinion Polls in Political Competition. 36 pp.
656. *Peter Svedberg:* 841 Million Undernourished? On the Tyranny of Deriving a Number. 39 pp.
657. *Lars Calmfors:* Macroeconomic Policy, Wage Setting and Employment – What Difference Does the EMU Make? 52 pp.
658. *Torsten Persson and Guido Tabellini:* The Size and Scope of Government: Comparative Politics with Rational Politicians. 47 pp.
659. *Lars Calmfors:* Monetary Union and Precautionary Labour-Market Reform. 10 pp.
660. *Daron Acemoglu and Fabrizio Zilibotti:* Productivity Differences. 48 pp.
661. *Ramon Marimon and Fabrizio Zilibotti:* Unemployment vs. Mismatch of Talents: Reconsidering Unemployment Benefits. 35 pp.
662. *Yves Zenou:* Urban Unemployment and City Formation. Theory and Policy Implications. 35 pp.

663. *Stefan Palmqvist:* Why Central Banks Announce Their Objectives: Monetary Policy with Discretionary Signalling. 22 pp.
664. *Kjetil Storesletten:* Sustaining Fiscal Policy Through Immigration. 41 pp.
665. *John Hassler,*
José V. Rodríguez Mora,
Kjetil Storesletten and
Fabrizio Zilibotti: Equilibrium Unemployment Insurance. 56 pp.

1999

666. *Michael Woodford:* Optimal Monetary Policy Inertia. 112 pp.
667. *Lars E.O. Svensson:* Monetary Policy Issues for the Eurosystem. 54 pp.
668. *Assar Lindbeck:* The Price in Economic Sciences In Memory of Alfred Nobel 1969-1998. 28 pp.
669. *Lars E.O. Svensson:* The Equilibrium Degree of Transparency and Control in Monetary Policy. 25 pp.
670. *Assar Lindbeck and*
Solveig Wikström: The ICT Revolution in Consumer Product Markets. 23 pp.

ISSN 0347-8769
 Stockholm, 1999
 Institute for International Economic Studies