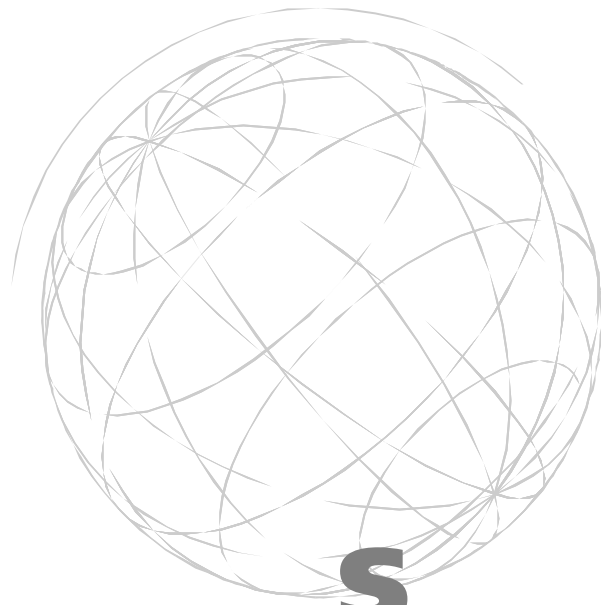




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**ELECTRONIC
COMMERCE
AND THE ROLE
OF THE WTO**

Marc Bacchetta, Patrick Low,
Aaditya Mattoo, Ludger Schuknecht,
Hannu Wager and Madelon Wehrens*

*The authors are members of the WTO Secretariat. The opinion expressed in this study are those of the authors. The authors would like to thank Jean-Guy Carrier, David Dunkley, K. Michael Finger, David Hartridge, Markus Jelitto, Masamichi Kono, Vesile Kulacoglu, Pierre Latrille, Patrick Lydon, Denby Misurelli, Heinz Opelz, Maika Oshikawa, Adrian Otten and Lee Tuthill for helpful comments. They would also like to thank Lidia Carlos, Anne Hughes and Aishah Colautti for secretarial support.

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I. Summary and Introduction

Recent advances in three areas — computer technology, telecommunications technology, and software and information technology — are changing lives in ways scarcely imagined less than two decades ago. New means of exchanging information and transacting business are transforming many aspects of social and economic organization. These modern technologies are being combined, especially through the Internet, to link millions of people in every corner of the world. Communications are increasingly unburdened from the constraints of geography and time. Information spreads more widely and more rapidly than ever before. Deals are struck, transactions completed, and decisions taken in a time-frame that would have seemed simply inconceivable a few years ago. This technological revolution will increasingly touch every area of activity where the digital transmission of information serves a purpose, whether it be in the office, in business, or in the worlds of shopping, leisure and entertainment.

There were only some 4.5 million Internet users in 1991, and estimates suggest that there will be as many as 300 million or more by the turn of the century. The technology upon which the Internet is based offers much greater versatility as a medium for conveying information than do letters, telephones and faxes. The spread of this technology will be accelerated significantly through cost reductions occasioned by continuing technical advance, which, combined with increased efficiency driven by competition, will bring significant benefits to consumers through lower prices and greater choice. Modern communication technology offers prodigious scope for new educational and training opportunities, for spreading understanding and knowledge, for transacting business, and for enjoying a broad range of leisure activities. The value of electronic commerce has catapulted from virtually zero to a predicted US\$300 billion in the ten years up to the turn of the century.

Because the Internet is an open communications system, facing little technological constraint on its expansion, it creates a “borderless” environment for communications. Wherever the necessary communications hardware and software are in place, information can flow from one location to another along a seamless web, without regard for distance and jurisdiction. For society at large, this means unprecedented opportunities, and these opportunities will grow in ways that few of us have yet imagined. But challenges and responsibilities come with opportunity.

As to the division of responsibility between the private and public sector in creating the appropriate environment for the new information media, many would argue that governments have a key responsibility to support

the spread of benefits from modern communications technology as widely as possible within society, mainly through creating the underlying conditions in which the technology will flourish. The appropriate division of responsibility between government and the private sector in the regulatory field may differ in regard to the formulation and implementation of policies. Second, an important challenge is to define the appropriate scope of intervention in pursuit of legitimate public policy objectives, so as to secure such objectives without compromising the promise of these modern technologies. Third, the global reach of the Internet and similar technologies that might emerge in the future implies a need for international responses to some of the policy challenges, and thus for active cooperation among governments. Finally, special attention may be needed to ensure that developing countries benefit from these new technologies.

The focus of this study is upon electronic commerce in particular, and not the broader domain of modern information technology in all its guises and uses. Electronic commerce may be simply defined as the production, advertising, sale and distribution of products via telecommunication networks. Most of the discussion is limited to the Internet - the medium with which electronic commerce is primarily associated. The study points out, however, that earlier technological innovations such as the telephone and fax have been used in similar, albeit more limited, ways to conduct business electronically, and future directions in which technology may lead remain uncertain. The study distinguishes among three stages in electronic transactions - the searching stage, the ordering and payment stage, and the delivery stage. These interactions may be between interested parties on an arms-length basis, or may involve transactions within firms.

The searching stage is where suppliers and consumers interact in the first instance. This stage may or may not lead to an actual transaction. The second stage entails ordering and payment for the good or service, typically through the electronic transmittal of credit card or bank account information. The third stage is delivery. Only those transactions that can be concluded through electronic delivery of digitalized information may be carried through entirely on the Internet. Electronic commerce via the Internet must end at the second stage for purchases which cannot be delivered electronically, including physical goods like flowers or bicycles, and services that can only be supplied if the supplier and consumer are in physical proximity, like haircuts, tourism and construction. It is the expanded scope for the third stage of electronic commerce transactions — that of taking electronic delivery of the purchase — which is perhaps the

most notable contribution of Internet technology and the most challenging aspect from a policy perspective.

This study is a factual exploration of the benefits and challenges associated with the development of electronic commerce and the Internet. It does not prescribe specific policy actions, but rather attempts to identify the main policy challenges, focusing in particular upon how these relate to international trade and the WTO.

Organization of the study

The early sections of the study (Sections II and III) provide a broad introduction to the subject of electronic commerce, drawing on various sources, especially the ITU and OECD. Section II describes the salient characteristics and uses of electronic commerce. Section III discusses the economics of electronic commerce and the Internet, including ways in which the nature of the instrument itself is changing the structure and efficiency levels of some markets, the costs of various inputs into the production process, and ways of doing business. The role of competition is identified as a key factor in enhancing and spreading the benefits of new communication technologies.

Section IV focuses on the growth of electronic commerce, noting the rapid expansion that has occurred in a few short years, and reporting on forecasts for continuing rapid growth. Some estimates suggest that within five years, Internet-based electronic commerce could account for 2 per cent of all commercial transactions. Such estimates are hazardous because of the very limited experience upon which they are based, but few doubt that growth in electronic commerce will be vigorous and sustained. While the bulk of electronic trade takes place in the United States, greater geographical dispersion is expected over the next few years. Expansion in the use of the Internet for commercial transactions is likely to occur in many sectors, including financial services, telecommunications, advertising, travel and entertainment services, and professional services. Business-to-business commerce and retailing in some sectors will be transformed, and strong demand is anticipated in all sectors linked to the provision of infrastructure for electronic commerce.

Section V switches to a policy discussion, focusing on what appear to be the most important challenges for policy-makers arising from electronic commerce. The study suggests that even though governments may be determined to ensure that the potential benefits of electronic commerce will be fully realized, and believe that a combination of the market and self-regulation by business can do much to safeguard this objective, there still remain certain areas where governments will have a role to play. The precise degree of direct government intervention required to achieve particular objectives cannot necessarily be pre-defined, and the study is careful to avoid prescription in this regard. Some of the areas of

likely concern, however, include: i) standards for the emerging global telecommunications infrastructure; ii) adequate investment in the infrastructure; iii) user-friendly and broad-based access; iv) a predictable legal and regulatory environment which enforces contracts and property rights; v) the security and privacy of information; vi) rules for dealing with what constitutes unacceptable or conditionally acceptable content; vii) a predictable framework of taxation and financial regulation; and viii) equality of opportunity through better access and education for those least well-placed to adapt to the new environment.

None of these issues are new, but the speed of change in communications technology makes it important to ensure that regulation neither falls behind nor unnecessarily interferes with the development of electronic commerce. While some of the policy issues identified above are concerned essentially with creating appropriate underlying conditions for the conduct of business, others impinge directly upon actual transactions carried out over the Internet. Of particular relevance in the latter context are content regulation and taxation, which are among the most delicate issues that will have to be addressed. In all cases, however, the fact that electronic commerce via the Internet so clearly has inter-jurisdictional ramifications would seem to presage a need for governments to consider the appropriate scope of international cooperation.

Section VI focuses more specifically on policy issues that appear to be of direct relevance to the work of the WTO. The first part of the discussion deals with trade policy aspects of access to infrastructure, emphasizing the importance of efficient and low-cost supply of the essential "raw materials" for the conduct of electronic commerce. The study reports on progress already made in the WTO in opening up and promoting competition in markets for basic telecommunication services and information technology products. It goes on to examine briefly the legal framework of the General Agreement of Trade in Services (GATS) insofar as it has an impact on access to some of the basic infrastructure relevant to electronic commerce. This part of section VI also considers the question of coverage of Internet access services in Members' commitments in basic telecommunication services.

Section VI then takes up market access issues. It notes recent initiatives by the United States, and jointly by the EU and the United States, to promote a customs duty-free environment for electronic transactions. It is emphasized that these initiatives refer only to customs duties, and not to other taxes. This is followed by a discussion of how electronic commerce might be characterized in WTO terms, and what the implications of different approaches would be for the policy regime. Among the issues here is whether services transactions over the Internet could be considered trade in goods, trade in ser-

vices, or a different kind of trade. The study suggests that the content of some digitalized information flows would seem at first sight to resemble trade in goods, while a range of services transactions are already covered under the structure and trade liberalization commitments of the GATS. Significant differences in the rules of GATT and GATS would need to be taken into account in any discussion of the approach to this issue. If neither a goods nor a services characterization is deemed suitable, different rule-making challenges emerge. In line with the approach taken in this study, no conclusions are drawn as to what might be the best approach to securing a suitable legal and institutional framework for electronic trade. A general point is made, however, about the desirability of ensuring policy neutrality so as not to distort economic incentives and decisions.

The third part of Section VI focuses on trade liberalization under the GATS, bearing in mind that existing and possible future market access commitments in GATS have a direct impact on the conduct of electronic commerce. The fourth sub-section examines briefly the relationship between electronic commerce and trade facilitation, noting in particular how the open Internet-based system underlying electronic commerce can contribute to reducing the costs of trade and streamlining customs administration.

The fifth and sixth parts of Section VI respectively examine the implications of electronic commerce for public procurement and intellectual property rights. Governments are making increasing use of electronic means for procurement, giving rise to the question of how far international rules may need to be developed to facilitate electronic procurement. A large share of electronic commerce based on the Internet involves products protected by intellectual property rights, and intellectual property rights also play an important role in the development of infrastructure and access-related equipment. Electronic commerce and the Internet will affect the way intellectual property rights are administered, and

may raise certain issues relating to copyright and trademarks in particular.

The final part of the study focuses on regulation, identifying some of the jurisdictional, monitoring and enforcement issues raised in electronic commerce. It distinguishes three categories of regulatory intervention. The first involves universally shared regulatory objectives aimed at prohibiting particular kinds of content, such as child pornography or bomb-making instructions. The second category also entails prohibition or direct control of content, but involves objectives that are not shared by all jurisdictions, on account of national differences in standards and values. The third category comprises activities where there is no interest in preventing or discouraging commerce, but where the authorities seek to protect consumers either through the establishment of preconditions for market entry, such as licensing or qualification requirements, or through the dissemination of information that permits consumers to make more informed choices.

The study notes that approaches to regulation may differ, depending on the objective. A key question is the degree to which governments see a need to establish co-operative arrangements internationally for the purposes of defining regulatory approaches and/or the enforcement of regulations. A second question is how far direct regulation by government is necessary, as opposed to self-regulation by business. A third issue is the feasibility of attempting regulation "at the border". It is already the case, for example, that much regulation in the sphere of both goods and services takes place at the point of production or supply, and not at the frontier. Finally, both the GATT and the GATS have established precedents for dealing with the trade policy aspects of regulation - emphasizing the objective of applying the least-trade-restrictive measures available in a transparent and non-discriminatory manner to achieve a given public policy objective.

II. The Main Instruments of Electronic Commerce

Six main instruments of electronic commerce can be distinguished: the telephone, the fax, television, electronic payment and money transfer systems, Electronic Data Interchange and the Internet. This is a broad definition of the term "electronic commerce"; in many discussions, electronic commerce only refers to the Internet and other network-based commerce. Nevertheless, instruments such as the telephone, fax and television are already used for commercial transactions, especially in industrialized countries. It is not uncommon, for example, to make orders over the phone and pay for them by credit card. The emergence of new instruments such as the Internet did not, therefore, invent electronic commerce. But the Internet does open up many new possibilities: with the Internet all elements of a commercial transaction can be conducted on an interactive basis with one or many people, unconstrained by time and space, in a multimedia environment with sound, image and text transmission, and at relatively low (and still declining) costs. This makes the Internet much more versatile than other instruments of electronic commerce. The latter typically need to be combined with each other or with more traditional instruments such as mail or physical shopping, to conclude a transaction. The Internet will, therefore, reduce barriers to communication and trade to a greater degree than established electronic and traditional means of commerce, and following the introductory discussion in this section, most of this study focuses on the Internet. A summary of the main features of various electronic commerce instruments can be found in Table 1.

A pervasive instrument of electronic commerce is the telephone; almost one billion lines and cellular subscribers are reported worldwide

The oldest and so far most important instrument of electronic commerce, or of conducting business via telecommunication networks, is the telephone. A number of characteristics have helped the telephone to achieve and maintain a leading role in commercial transactions. One reason is its widespread availability: there is one telephone for every two inhabitants in OECD countries, and many developing countries report one telephone for every ten of their inhabitants (Table 2). The number of telephone lines and cellular phone subscribers combined reached 900 million in 1996. By the year 2001, 1 billion phone lines are expected to exist, with a further 400 million people connected to the telecommunication networks via cellular phone (Table 3). This is equivalent to almost one quarter of the total world population projected for that year.

It is possible to advertise, negotiate, purchase and pay for goods and services by telephone, and the telephone is increasingly inexpensive and easy to use

The telephone is a very versatile instrument: it allows for goods and services to be advertised, purchased and paid for (in conjunction with a credit card). Selected services are even distributed over the phone and then paid for through the phone bill. Such services can include, for example, telephone banking, a telephone directory inquiry, the sandman calling to announce bedtime for children, or certain types of adult entertainment. A non-standard transaction which may require some negotiations can be conducted much more easily by interactive communication over the telephone than by mail. Other advantages of the telephone are the low cost of equipment and the user-friendliness of the instrument. The telephone also requires very little bandwidth - that is, capacity for data transmission.

In many instances, however, the phone only prepares transactions which are then concluded on paper and lead to physical delivery of a product. Until recently, the telephone's communication potential was limited to voice (spoken) communication between just two people, but telephone conferences and even video conferences have now become possible. High-quality video conferences, however, require considerable up-front investment in equipment and bandwidth. The latter is not available on a standard phone line, or even on a more powerful, digital ISDN circuit (Table 4). The use of video phones and video-conferences is therefore still very limited.

In many countries, the use of telephones is relatively cheap, and fees for local calls are sometimes even included in the basic connection charge. Charges for long-distance and international calls, however, vary dramatically across countries. This limits the use of the telephone for long-distance purposes, especially in poor countries. However, declining costs and competition among telephone service providers have brought down rates markedly in many countries. Rates for international calls made in the United States, for example, have declined by a factor of 300 since 1930. If current costs for long distance or international calls in low-cost countries such as the United States are any measure of the savings potential in other countries, we are likely to witness further significant falls in telephone charges in the near future.

Faxes offer speedy business communication and document transmission

The main advantage of the fax lies in replacing traditional mail services with more speedy document trans-

Table 1: Electronic Commerce: Features of Main Instruments

	Elements of commercial transaction		Technical Features			Ease of Access				
	Elements which can be conducted	One versus multi step transaction ¹	Type of data transmitted	"Interactive" potential	Communication potential	Start-up costs for "consumers"	Operating costs for "consumers"	Start-up costs for "producers"	Capacity (band-width) problems	User-friendly
Standard telephone	(Production), advertising, purchasing, payments, (distribution)	Multi ²	Voice ³	Yes	one-one ⁴	Low (phone + connection charge)	Depends on phone charges	Low (phone + connection charge)	No issue	Yes
Facsimile	Advertising, purchasing, payments, distribution	Multi	Data/text, image	No	one-one ⁵	Moderate (fax machine + connection charge)	Depends on phone charges	Moderate (fax machine + connection charge)	No issue	Yes
Television	Advertising, consumption, (payments) ⁶	Multi	Voice, image	No	one-many	Moderate (television + possible connection charge)	Low	High (studio, equipment, etc.)	No issue	Yes
ATM, credit + debit cards, smart cards	Payments	Multi	Data/text	No	one-one	Low (card)	Low (free or small fee)	Moderate to high (ATM machine, agio)	No issue	Yes
Electronic data interchange (EDI) ⁷	Advertising, purchasing, payments	Multi	Data/text	No ⁸	one-one one-many	High (equipment + various connection costs)	Depends on line charges	High (equipment + various connection costs)	Potential bottlenecks in combination with Internet	No
Internet and online services	Production, advertising, purchasing, payments, ⁹ distribution	One or multi	Data/text, image, voice (= multi media)	Yes	one-one one-many many-many	Moderate (PC, modem, possible connection charge)	Depends on line and service charges	Significant one-off costs for website (but typically lower than "real" shop) ¹⁰	Potential bottlenecks	Not yet always

¹ Advertising, purchase, payment and distribution possible in one step.

² One-step transactions are possible, e.g. in telephone banking. More sophisticated phone applications are emerging, including telephone conferencing, video conferencing and data transmission.

³ Telephone video conference allows image transmission.

⁴ Telephone conferences and telephone video conferences allow communication from one to many people.

⁵ Can also be one-many, e.g. via fax mailing lists.

⁶ For example, video channels in hotels.

⁷ Traditional EDI with own "hub and spoke" network.

⁸ But automatic quasi-interactive transactions possible.

⁹ Today mostly in combination with credit card.

¹⁰ Technology integration, e.g., with existing payment systems, in banking, can be costly too.

Table 2: Access to the Telecommunication Infrastructure, Selected Countries, 1996¹

Country	Telephones per 100 inhabitants	Fax per 100 inhabitants	Cable TV per 100 households	Personal computers per 100 inhabitants	Internet hosts per 100 inhabitants
Industrialized countries:					
Australia	49.6	2.5	....	31.2	2.81
Canada	57.5	2.4	....	19.0	2.01
Finland	55.1	2.4	27.0	18.1	5.52
France	54.7	2.7	3.0	15.1	0.42
Germany	48.3	1.8	31.0	18.2	0.87
Italy	42.9	2.2	....	9.2	0.26
Japan	47.8	6.8	....	12.8	0.59
Netherlands	50.9	2.9	84.1	23.2	1.74
Sweden	68.3	3.4	43.0	21.3	2.61
United Kingdom	48.9	2.4	2.0	18.0	1.00
United States	59.5	7.3	59.0	36.4	3.80
Developing and transition countries:					
Argentina	14.1	0.1	....	2.4	0.04
Brazil	7.4	....	....	1.8	0.05
Chile	11.0	....	....	3.7	0.10
China	2.3	0.0	....	0.3	0.00
Hong Kong, China	54.0	4.3	....	15.1	0.78
India	1.1	0.0	....	0.2	0.00
Indonesia	1.3	0.0	....	0.5	0.01
Korea (Rep. of)	39.6	0.8	....	13.2	0.15
Mexico	9.2	....	....	2.9	0.03
Poland	13.1	0.1	....	3.6	0.14
Russia	16.2	0.0	....	2.4	0.05
Singapore	45.5	....	....	21.7	0.95
South Africa	9.1	0.2	....	3.9	0.24
Turkey	20.1	....	....	1.4	0.02
Selected country groups:					
EU	47.6	2.2	20.5	15.1	0.79
OECD	44.6	3.5	....	18.1	1.43
Non-OECD	....	....	....	0.8	0.02
WORLD	11.5	0.7	....	4.3	0.28

¹ Or closest year available.

Sources: ITU, "Challenges for the Network", 1997a; OECD, "Information Infrastructures: Their Impact and Regulatory Requirements", 1997a; UNDP, "UN Human Development Report", 1997.

Table 3: Growing Networks for Electronic Commerce

(Million units)

Category	1991	1996	2001 (Proj.)
Telephone main lines	545.0	741.1	1000
Cellular subscribers	16.3	135.0	400
Personal computers	123.0	245.0	450
Internet host computers	0.7	16.1	110
Personal computers with Internet access (Internet users)	4.5	60.0	300

Source: ITU, "Challenges to the Network", (1997a).

mission. The fax is also frequently used as a substitute for the telex which, in the past, provided a paper trail for commercial transactions.¹ Although in principle a number of commercial functions such as advertising, purchasing or the initiation of payments can be carried out by fax, this instrument lacks the potential for the transmission of voice communication and sophisticated images (the quality of faxed photographs, for example, is typically very low). Interactive communication is not possible, and any complication in a transaction requires an additional fax or phone call for clarification. Fax charges, network access, bandwidth requirements, and user-friendliness are similar to the telephone, although fax machines are typically more expensive. These characteristics have made the fax important in communication and commerce between businesses, but much less so among individual consumers. There is less than one fax per ten telephone lines in OECD countries, and less than one fax machine per 100 inhabitants in the world as a whole (see previous Table 2).

One billion televisions worldwide broadcast advertising and invite "home shopping", but television is a "one-way street" of communication

The television enjoys an even more widespread distribution than the telephone. There are over 1 billion televisions in the world, with every second inhabitant in industrialized countries and every seventh inhabitant in developing countries owning a television set. One in five households in the European Union and more than every second household in the United States are now connected to Cable TV. At first thought, few people would consider television as a means of electronic commerce, but a large share of shopping from home is shaped

through advertising and shopping programmes on television. Television advertising, for example, absorbs one quarter of all advertising expenditure in the United States. Cable TV has extended the commercial potential of television by providing many additional channels and introducing new facilities such as interactive TV or pay-per-view TV.

One limitation of television as an instrument of electronic commerce is the need to conduct transactions in multiple steps. After watching an advertisement, the convinced viewer has to pick up the telephone, make payment, and then await delivery of the desired product. In other words, television is a "one-way street" of communication where viewers cannot actively seek offers or negotiate the terms of a transaction.² In addition, the production costs of a TV spot are rather high, and involve considerable outlays on studios and equipment. However, the relatively low costs of a TV set and subscription charges for the viewer, as well as the user-friendliness of TV, have contributed to its success as a means of entertainment and commerce. Furthermore, access to cable TV could become very important to future electronic commerce applications with large capacity requirements, since cable TV lines have much more bandwidth than telephone lines.

Table 4: The Need for Bandwidth

	Bandwidth requirement	Telephone line equivalent
"Standard" telephone	19 K bit/s ¹	1
Common web connection	29 K bit/s	1.5
ISDN circuit and Internet telephony	64 K bit/s	3.3
High quality video conference	2 M bit/s ²	104
Standard television	10 M bit/s	521
Full motion color TV	90 M bit/s	4700

¹K bit/s = 1000 bits per second

²M bit/s = million bits per second

Source: OECD, "Information Technology Outlook", 1997i.

Electronic payment systems are boosting electronic commerce, with much potential for the use of smartcards

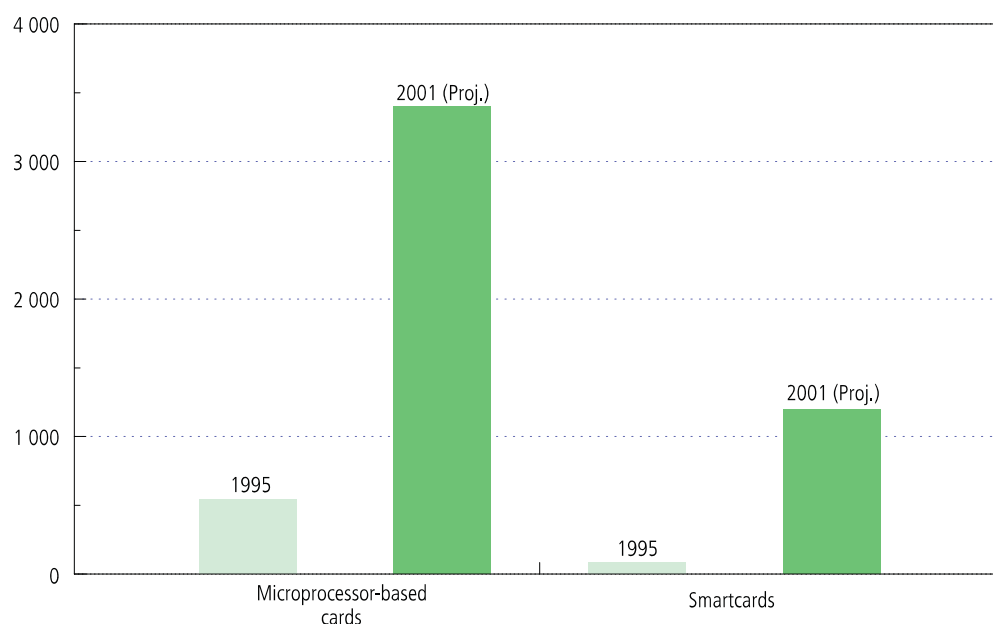
Electronic payment and money transfer systems like automatic teller machines (ATM), credit cards, debit cards or smartcards are also part of electronic commerce.³ Although these instruments typically only serve

¹As the telex is similar in its functions to the fax, they are discussed jointly.

²An exception is interactive TV which, so far, has not been very successful with users.

³Computer-banking uses telecommunication networks in a similar manner as electronic data interchange or the Internet, and therefore can be seen as an early electronic means of financial service provision.

Chart 1. The Prevalence of Microprocessor Cards and Smartcards, 1995 and Projection for 2001
(Number in circulation, in millions)



Source: Motorola, 1997.

to make or receive payments, they have become very important complements to other means of electronic commerce and “conventional” commerce. ATM machines are now the standard means for balance inquiries and cash withdrawals in industrialized countries (Table 5). Many millions of credit and debit cards are used routinely for making payments.

Microprocessor-based cards with much more information storage potential, including so-called “smart-

Table 5: Automatic Teller Machines, Selected Countries

(Machines per million inhabitants)

	1978	1986	1994
Canada	11	127	578
France	19	172	355
Germany	...	66	361
Italy ¹	...	76	378
Japan	111	494	978
United Kingdom	39	182	334
United States	44	286	418
Average	49	200	487

¹1987 and 1995 for Italy.

Source: OECD, “Financial Market Trends”, No. 67, June 1997e.

cards” with credit, debit, and money storage abilities have emerged in recent years. Microprocessor-based cards of various kinds are quite well established in Europe (the best known being telephone cards), whilst the older and simpler magnetic strip cards still dominate in the United States. Very powerful smartcard systems are presently being introduced, which can prove the identity of the buyer in an electronic transaction, and encrypt (code) the card number, the credit limit and the expiration date of the card for maximum security of electronic transactions. By contrast, all magnetic-strip-based credit or debit card information needs to be verified through an extra phone call or a machine next to businesses’ cash registers. Consequently, the use of microprocessor-based cards and smartcards is projected to rise rapidly in the near future (Chart 1).

Electronic Data Interchange facilitates business-to-business transactions and trade; an extension to the Internet is promising

Another important instrument of electronic commerce is so-called Electronic Data Interchange or EDI. EDI typically entails the exchange of documents and information between the computers of two businesses without human intervention. Its purpose is to lower costs and speed up bidding, order taking, invoicing, and so on (Jimenez, 1997). Bidding for contracts via EDI, for example, has re-

Box 1: The History of the Internet

The origins of the Internet go back to the 1960s when new ways of communicating between researchers were sought. In 1969, the ARPANET (Advanced Research Projects Agency Network) was established between four U.S. Universities with support from the Department of Defense. The ARPANET allowed communication between users through the "Network Control Protocol" which converted messages into streams of packets at the source, and then reassembled them back into messages at the destination. During the first decade, the ARPANET was mainly used to facilitate e-mail (the first one was sent in 1972), support online discussion groups, allow access to distant databases, and support the transfer of files between government agencies, companies and universities. The Pentagon became briefly interested in the ARPANET as a wartime communication tool, but this idea was quickly abandoned. During the early 1980s, the TCP/IP protocol was introduced, which set standards for the flow of information across networks and allowed the identification of users through Internet addresses or domain names. This gave rise to communication between various interconnected networks and, thus, the Internet was born.

In 1990, the World Wide Web (WWW) was created, allowing the online transmission of webpages, which integrated text and graphics for the first time. In order to facilitate information exchange over the web, various programs and applications were introduced, which made the once research-oriented system more accessible for commercial and private use. Commercial activities on the Internet, such as virtual shopping and online banking, started in 1994. Meanwhile, public support for the Internet in the United States (mainly from the Defense Department and the National Science Foundation) had been largely phased-out.

Since its beginning in 1969, the Internet has experienced rapid growth. The number of hosts grew from 32 in 1972 to 10,000 in 1978, 100,000 in 1989, and to 1,000,000 in 1992. By July 1997, almost 20 million hosts were reported, and projections are for a further rapid increase to as much as 300 million users by 2001. The first international "online" links were established in 1973, with connections between the United States, the United Kingdom and Norway. In 1997, more than 110 countries were connected to the Internet, and universal coverage is foreseen in the near future.

In the 1980s, a number of European countries had already introduced network-based communication systems using pre-Internet technology, of which the French Minitel system is probably the most well-known. The Minitel is a purely text-based medium which uses standard telephone lines and which offers numerous services from shopping to stock quotes. By 1994, 6.5 million terminals were registered, resulting in total sales of FF 6.6 billion (about 1.1 billion US\$). The prominence of Minitel, however, initially delayed the use of the Internet by French businesses and consumers, so that in 1997, the development of an Internet-compatible Minitel was started, which will allow the Minitel to become an integrated part of the Internet (OECD, 1997f).

Sources: Hobbes Zakon, R. "Hobbes' Internet Timeline", 1997; Hafner and Lyon, 1996; OECD, 1997f; Wendell, K. "Internet History", 1997.

sulted in cost savings of 5-20 per cent, and time savings of 50 per cent for firms. EDI has also been applied successfully in automating customs administration and, thereby, facilitating international trade. To give an example, one could imagine that EDI results in the following transactions without any human intervention: a car producer's stock of tyres falls below a certain threshold. Automatically, its computer sends out an order requesting delivery of tyres from the tyre factory. The computer at the receiving end confirms this request, processes the order for delivery and sends back a confirmation and a bill. On receipt of the tyres, the computer of the car manufacturer automatically initiates payment of the bill.

In the past, EDI was normally used between big manufacturers and their suppliers in a so-called hub-and-spoke system. Members of the EDI system became part of an established network with its own telecommunication infrastructure and standardized forms. Equipment and connection costs rendered participation in the EDI system quite expensive, limiting its proliferation. In 1996, only about 200,000 of the United States' 6 million firms (but 95 per cent of the biggest 1000 firms) participated in EDI. Participation worldwide

reached 500,000 firms in the same year (ITU, 1997a). In the past, superior security (e.g., compared to the Internet) favoured such hub-and-spoke systems. However, with technological solutions to security concerns in sight, the future will probably lie in extending EDI access through Internet gateways.⁴ This will allow much cheaper access for small and medium-sized firms. As a consequence, 30-40 per cent of U.S. businesses are expected to use EDI by the year 2000.

300 million Internet users are expected by 2000, extending the scope of what and how we trade

The main focus of recent interest in electronic commerce has undoubtedly been on the Internet. For almost three decades, the Internet's reach virtually doubled every year (see Box 1). By 1991, the number of users had reached about 4.5 million; by 1996, 60 million Internet users were reported, and this number is likely to grow to about 300 million or 5 per cent of the world's population by 2001. Commercial transactions on the Internet in 1996 accounted for only a fraction of one per cent of all transactions in the United States, but this share is likely

⁴One way to illustrate the difference between EDI and the Internet is in terms of the degree of openness of the networks they use. Where EDI is operated through "closed networks", only registered users have access. With gateways to the Internet, EDI will operate increasingly through open networks. This will blur the distinction between closed-network-based EDI versus open-network-based Internet commerce. The distinction between the two, as presented in Table 1, will therefore become somewhat artificial in the future.

to grow to 2-3 per cent by 2001, and to about 14 per cent of all consumer purchases by 2007.

The Internet is an extremely versatile means of commerce. In respect of some products, all elements of the production and distribution chain can be completed online and across borders: for example, after reading an online advertisement, a customer in Switzerland can send a data request to the American owner of a databank stored in Canada. The computer of the United States company forwards the data request to the databank for automatic retrieval. The retrieved data is then sent from Canada to the United States. The computer in the United States requests, receives and verifies the credit card payment or possibly the electronic money transfer from the Swiss client, and sends the requested data to Switzerland. In other words, advertising, production, purchase, payment and delivery of the service can be conducted electronically through just one instrument: the Internet.⁵ This degree of automation is still the exception rather than the rule, and frequently customers still pay by phone and credit card after ordering on the Internet. However, this example shows the enormous potential of the Internet for electronic commerce in certain sectors.

Another strength of the Internet is its multimedia potential with simultaneous voice, image and text transmission. Downloading of documents (text), conducting telephone calls over the Internet (voice)⁶ and games and pictures (image) are already available online. But many observers see potential in the interactive and simultaneous transmission of all three types of data in a digital format, for example, for online video conferences and multimedia services.⁷

The Internet will also extend the scope of what is tradeable. In the past, many services were considered non tradeable, but through the Internet, many medical, legal, architectural, travel, accounting, education and numerous other services could become tradeable over long distances within and across countries (Primo Braga, 1997). Assume, for example, the following, rather exotic example: in the past, an X-ray of a crash victim had to be analyzed on the spot by a local doctor. It would have been much too time-consuming to send the image somewhere else for diagnosis. Now, it is possible for such images to be sent instantaneously to a specialist somewhere else, possibly in another country, who then e-mails back a diagnosis. This extension of the frontier of tradeables is due to the fact that, in principle, all of the goods and services which can be digitalized can be transported over the Internet - such as extracts from databanks, mu-

sic, films, documents, medical diagnostics and imagery, lectures and classes, stocks and bonds and much more.

However, there are two uncertainties arising from this extended boundary of what is tradeable. First, it may sometimes be difficult to determine where a transaction has actually taken place: assume the X-ray is sent from country A to an Internet address in country B which then contacts a specialist in country C. The hospital in country A may think this is a service from country B while it is, in fact, "outsourced" to country C. To further complicate matters, the owner of the Internet address in B may actually be located in yet another country D. These locational complexities pose a potential nightmare for lawyers, regulators and tax collectors (OECD Observer, 1997k).⁸ Second, the border between what constitutes a good and what constitutes a service can become blurred. Indeed, some might even argue that electronic transmissions of digitalized information are neither goods nor services. These are important issues for international trade and trade regulation, which will be discussed in more detail in Section VI.

In summary, the Internet can be used for a multitude of exchanges and transactions, including e-mail, leisurely reading and searching for information (browsing or surfing), advertising and promoting personal or business causes, linking people in private or professional circles, and publishing, selling, purchasing or providing services (OECD, 1996a). When asked why they are present on the Internet, companies respond that their website is mainly a means for advertising, communication and public relations, customer information, online sales and customer support (Chart 2). Given this multitude of functions of Internet-based electronic commerce, which allows purchases through companies' websites without a physical shop, people often speak of virtual (or cyberspace) shopping.

The Internet may also allow so-called "telecommuting", whereby people do all or part of their work from a computer terminal at home. Some firms have successfully experimented with telecommuting, which has helped them save particularly on office space. The office in these firms is becoming mainly a means of meeting and communicating. Telecommuting also allows employees to live far away from the office, which could alleviate urban congestion and may save employers some wage costs. However, only certain types of work with a high electronic data processing content and easily monitorable output are suitable for telecommuting. Lack of security and technical support at home, isolation

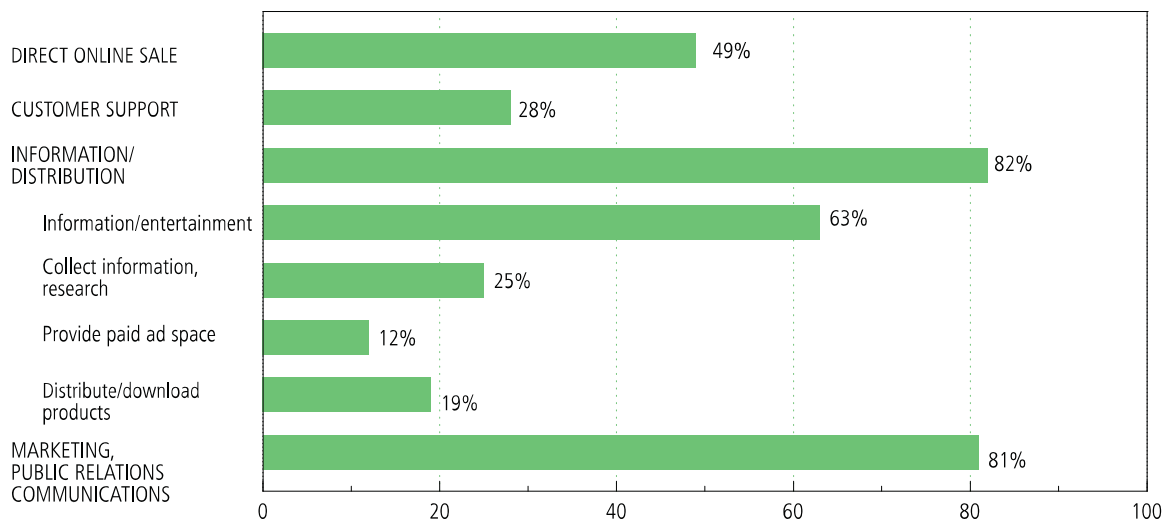
⁵Note, however, that payment by credit card in this example strictly speaking implies two instruments.

⁶Internet telephony has emerged in recent years, whereby calls are routed through the Internet (see below for further details).

⁷Data transmission in a digital format means that all data is transformed into strings of zeros and ones. Sound, text and images can be "digitalized" and then sent simultaneously through the net. Digital transmission is at the basis of the Internet. However, digital information can be transformed into analogue signals with the help of a modem. A second modem at the receiving end transforms the analogue signals back into digital ones. That is why Internet users can communicate through standard "analogue" telephone lines. A modem is not needed when sender and recipient have a so-called ISDN connection which allows digital data transmission.

⁸The fiscal and trade policy implications of such situations are discussed in later sections of the study.

Chart 2. Purposes for Maintaining a Website, 1993-1996
(In per cent of all websites)¹



Source: ActivMedia, Incorporated, 1997 (<http://www.activmedia.com>).

¹Based on survey responses.

of home workers and less time for managers to become better acquainted with their staff are additional disadvantages of telecommuting.

In some areas, the costs of Internet-based commerce are only a fraction of those of other instruments

The Internet is not only more versatile than other instruments of electronic and "conventional" commerce, it also compares favourably regarding delivery time and user costs.⁹ The operating costs of the Internet are typically very low. Time online can cost as little as a local telephone call of the same duration. Therefore, the costs of document transmission, telephone calls, and retail transactions over the Internet often compare very favourably with conventional commerce and other electronic instruments. Table 6 shows that the Internet-based e-mail transmission of a 42 page document from the United States, both abroad and within the United States, is much faster and cheaper than air mail, courier or fax. These ratios may not be quite as favourable for the Internet in countries where phone charges are higher, and where the delivery of e-mail can sometimes be delayed. However, the Internet seems already to be eroding regular mail and fax business. The price of Internet

telephony versus conventional telephony confirms this picture (Table 7). Chart 3 illustrates that transaction costs for an Internet purchase of, for example, software (which is then delivered through the Internet) are less than one tenth of a purchase made by telephone and one fiftieth of a purchase at a traditional retailer (OECD Observer, 1997k). Arguably, the savings are much lower as regards to the purchase of a book delivered by physical means, for example, where shipping and handling costs have also to be included, along with customs and tax administration costs, but the Internet will be competitive for a significant number of transactions.

Another important cost factor for sellers is the expenditure involved in "setting up shop". Start-up costs can be significant. A reasonably sophisticated Internet website for a bank, for example, can usually be established for about US\$ 50,000. Annual site maintenance costs (for changing and developing the site) are of a similar magnitude if no major technical complications arise.¹⁰ The reach of a site is potentially unlimited. The cost of setting up and maintaining a physical bank branch, on the other hand, is typically much higher and the potential reach is much more limited (Booz, Allen and Hamilton, 1997a).

⁹The next section will provide a more thorough discussion of this issue.

¹⁰Some banks have found the experience of integrating electronic banking with the existing data processing system to be very costly. This led a large German bank, for example, to take over another bank with a well-developed electronic banking system rather than develop its own (Die Zeit, November 21, 1997).

Table 6: Speed and Costs of Different Ways of Document Transmission¹

	Costs (US\$)	Time
New York to Tokyo		
Air Mail	7.40	5 days
Courier	26.25	24 hours
Fax	28.83	31 minutes
Internet e-mail	0.10	2 minutes
New York to Los Angeles		
Air Mail	3.00	2-3 days
Courier	15.50	24 hours
Fax	9.86	31 minutes
Internet e-mail	0.10	2 minutes

¹Example of sending a 42 page document.
 Source: ITU, "Challenges to the Network", 1997a.

Access and costs warrant improvement, and some technical and regulatory issues need to be addressed

Given the significant cost advantage of network-based data transmission in many areas, the spread of data exchange, e-mail, Internet telephony and electronic purchase of many goods and services is likely to continue. Companies, in particular, will find that without these cost savings they lose competitiveness. Business-to-business commerce is, therefore, likely to be the main growth area of the Internet in the near future. At the level of the individual consumer, however, the costs of a personal computer and a modem to gain access to the Internet are still considerable, and, once this equipment is purchased, it becomes obsolete very fast. Furthermore, Internet service charges, typically paid on a monthly basis to a service provider, plus the charges for using a telephone line can be quite significant. In 1996, monthly access charges for 20 hours online averaged US\$ 60 in OECD countries and exceeded US\$ 40 in all but four of them (Chart 4). Access charges are coming down, but even US\$ 20 per month is a sizable amount for consumers in industrialized countries and even more so in the developing world. Cable TV-based Internet usage could significantly reduce equipment costs, as first experiences with "Web TV" in the United States show.

Another frequent problem of the Internet is bandwidth limitations which at times cause congestion. It can be very frustrating to wait several minutes to access a simple website or download a short document. This problem is exacerbated by "information overload" and the poor quality of much of the information on the Internet. Furthermore, the Internet is not yet very user-

friendly; it takes moderate computer skills and quite some practice to move around the Internet with ease and to conduct purchases successfully. In addition, uncertainty about technical standards, the jurisdiction of transactions, the validity of contracts, possibilities of redress, the security and privacy of information, and the future role of government in regulating and taxing Internet activities (including international trade) could hold back the development of electronic commerce — issues we will come back to later in this study.

We do not know exactly in which direction electronic commerce will develop, but it is likely to change strongly the way we communicate and do business with each other

Given the advantages and shortcomings of the various instruments of electronic commerce, many people presently use the telephone, the fax, the Internet, and regular mail in a complementary manner. While we have pointed out some of the innovations and advantages of the Internet, it is uncertain which instrument or combination of instruments will dominate electronic commerce in the future. Other electronic and conventional means of transactions will react to the Internet challenge, for example, by lowering price or improving the scope and quality of services. On the other hand, technical progress may result in the convergence of various instruments of electronic commerce in comprehensive multimedia systems (European Commission, 1997a). Despite this uncertainty, there seems to be consensus that electronic commerce, especially via the Internet, will strongly influence the way we communicate and conduct business in the future. The next two sections of this study will provide arguments and empirical evidence in support of this claim.

Table 7: Pricing of Conventional Telephony Compared to Internet Telephony, 1996

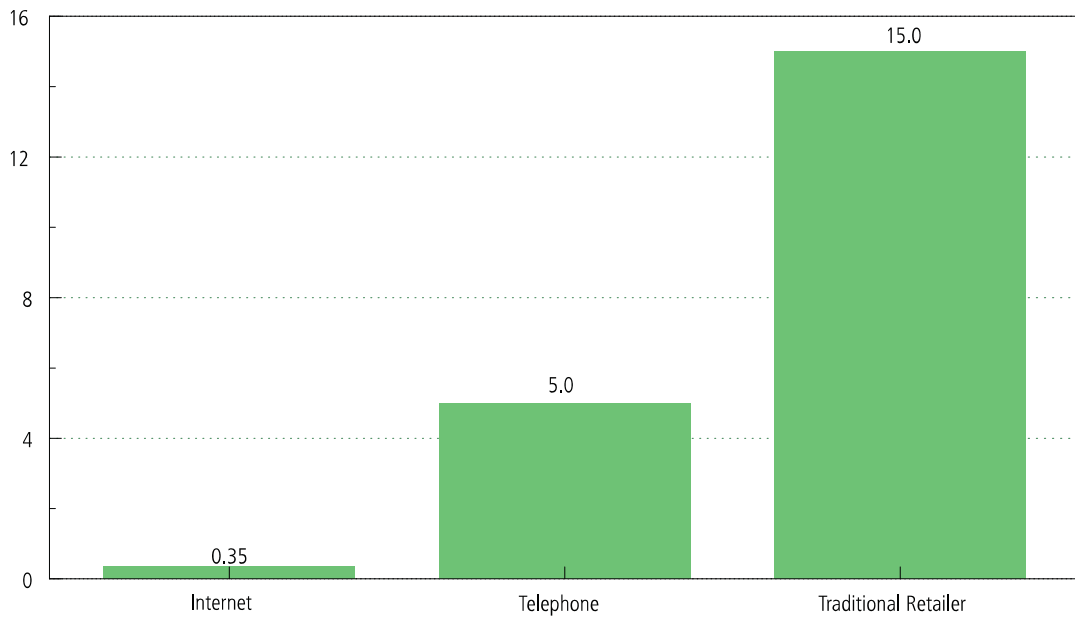
Telephone connection	Conventional telephony ¹ US\$/minute	Internet telephony ² US\$/minute
USA-Germany	0.78 - 1.36	0.10 - 0.45
USA-Nigeria	1.28 - 1.86	0.10 - 0.45
USA-Saudi Arabia	1.27 - 1.87	0.10 - 0.45
USA-Singapore	0.90 - 1.56	0.10 - 0.45

¹Range of rates charged by AT&T.

²The range of rates for Internet telephony shows the estimated level from the United States to foreign countries.

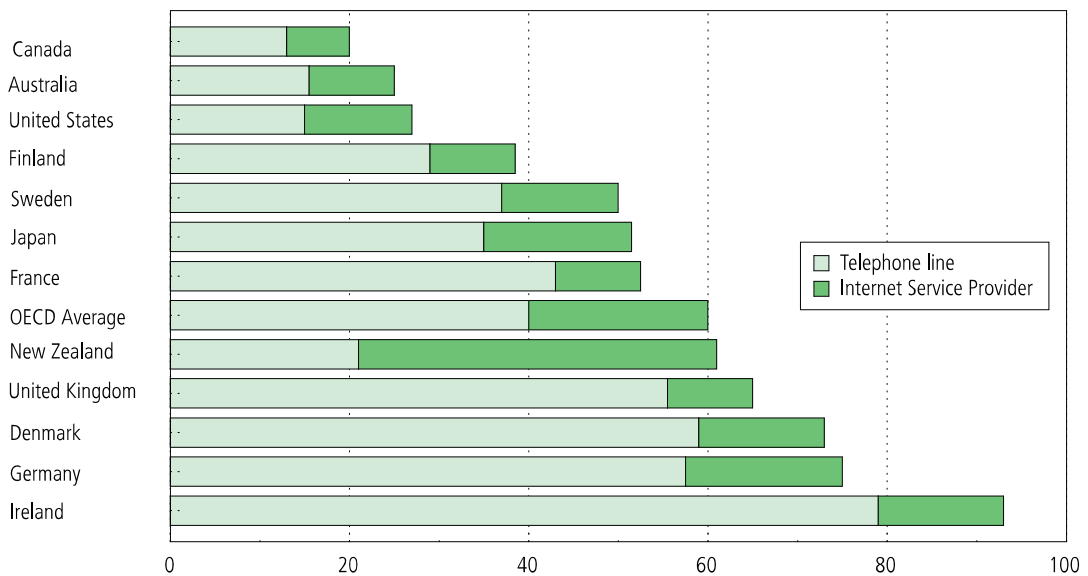
Source: ITU, "Challenges to the Network", 1997a.

Chart 3. Cost of Buying Software over the Internet Compared to "Traditional" Channels
(In US\$ per transaction)



Source: OECD, OECD Observer No. 208, 1997k.

Chart 4. Peak Rate Internet Access Charges, August 1996*
(In current US\$)



* 20 hours online per month

Source: OECD, Information Technology Outlook, 1997i.

III. The Economics of Electronic Commerce and the Internet

In the previous section it was argued that electronic commerce will provide many new opportunities. Transactions via the Internet, EDI and more sophisticated applications of the telephone and television have emerged through quite radical improvements in communication and information technology—a process which started with the discovery of electricity and the invention of the telephone and telegraph. The rapid progress in electronic commerce raises interesting and important new questions: how does the development of electronic commerce and the Internet affect economic actors, and what are the likely effects on economic growth and welfare?

The development of electronic commerce and the realization of its potential benefits have been discussed in the economic literature from two perspectives: (i) the necessary conditions for the provision and development of electronic commerce and Internet services; and (ii) the effects of electronic commerce and the Internet on sectors which apply these new means of exchange. The first question focuses mainly on infrastructure and access requirements, and the contribution of technological progress to cost-efficiency in the supply of electronic commerce and Internet services. The second question is concerned mainly with how electronic commerce and the Internet will affect supply and demand of goods and services in various markets, and with the impact of this medium on market structure and competition in various industries. In a nutshell, the proliferation of electronic commerce is predicted to lower transaction costs and production costs, facilitate entry and increase competition. This, in turn, will lower prices, increase quality, and create new and more diverse products, thereby increasing economic growth and welfare.

A. Conditions for the development of electronic commerce: infrastructure and access

Progress in information technology and infrastructure provision have permitted the development of electronic commerce, culminating in the emergence of the Internet

The growth of electronic commerce has been linked closely with the development and diffusion of new information technologies and of telecommunications infrastructure. New information technologies, which include

the fax, the digital telephone, and the Internet, have been discussed earlier. Telecommunications infrastructure has developed considerably over the past few decades, and now involves either fixed-line or radio-based networks which can both be used for electronic commerce. Fixed-line networks encompass telephone networks supplied through cable or wire links, cable TV networks, wire-based networks established by transportation utilities, and in some instances electricity distribution networks. Radio-based networks include cellular telephony, fixed-point radio-based networks, and satellite communication systems. In terms of infrastructure capacity requirements, the telephone and the Internet, so far, rely on relatively low capacity (narrowband) networks, whereas television utilizes broadband cable networks. Closed communication networks of varying capacity have also been adopted by some companies to exchange data electronically, e.g., through EDI.

The Internet is particularly important in establishing links between existing forms of electronic commerce. This is the reason why most studies on the development of electronic commerce focus on the growth of the Internet or on what is sometimes called the “GII”, the Global Information Infrastructure. This section will, therefore, focus largely on electronic commerce conducted via the Internet, although many of its findings apply to other instruments of electronic commerce.

Data transmission via the Internet utilizes telecommunications infrastructure very efficiently

The Internet is a network of networks (not surprisingly called “the web”) with broadly the following structure. At the “bottom”, i.e., closest to users, are local area networks. These networks are connected to a “mid-level” or regional network, which, in turn, connects to one or more “backbones”¹¹. Most backbone and regional network traffic moves over leased phone lines. However, these lines are not used in the same way for Internet and for normal phone services. In the case of phone services, an end-to-end circuit is set up each time a call is placed. This circuit is not accessible to other users until the call has ended, no matter how much data it actually transports. Such a system, called “circuit switching”, has proven very practical for real-time applications such as voice conversations, since data transmission is instantaneous. The system also allows for easy and detailed accounting of network usage.

¹¹This is how the U.S or the European portions of the Internet can best be pictured. But the Internet is rapidly becoming more and more complex, and it is increasingly difficult to obtain a complete overview of the network in a particular country. Individual service providers generally furnish maps of their own backbones which provide only a partial representation.

The Internet employs a different technology called "packet-switching". "Data sets" (meant in a generic way, i.e., an e-mail message is a data set as well) are broken up into packets, which are then sent independently over the network to their destination. No end-to-end circuit is reserved. Packets are simply passed from the source computer to router computers (these pass data along, based on information in the packet's header) until they finally reach the destination computer. The latter then reassembles the packets according to a specific protocol. Because routes are constantly optimized, different packets belonging to the same data set may take varying routes. The main advantage of packet-switching lies in so-called "statistical sharing" of communication lines, whereby packets from different sources can share the same line. Consequently, packet-switching can use a given capacity more efficiently than circuit-switching, where data are only transported between the connected parties, typically leaving much unused capacity.

The costs of Internet service provision include mainly line charges and routers

The conditions of supply of Internet services depend on the costs and pricing of such services. Turning first to infrastructure costs, the latter depend mainly on the charges for communications lines (which are mostly determined by telecom operators), on the price of routers and other computing facilities, and to a lesser degree on the wages and salaries of operators. When, in about 1970, routers became cheaper than lines, it became more efficient to use a technology which economizes on transmission capacity (McKie-Mason and Varian, 1995). This explains the preference for packet-switching over circuit-switching in the case of the Internet.

As line charges and routers are fixed costs, the marginal cost for sending an additional data package for a given capacity is essentially zero. One important exception to this is network congestion, which can result in significant costs in terms of transmission delays, longer access times, and possibly loss of information. These costs, however, are borne by users of the network and not directly by the Internet service providers. However, congestion costs have also been partly internalized by service providers through provision of extra capacity to accommodate peaks in demand.¹²

Flat-fee pricing schemes predominate, reflecting very low marginal costs, but these pricing schemes currently contribute to congestion

Given rapidly rising demand for Internet services and the need for new capacity and congestion management,

the pricing of Internet services is of key importance in providing the right incentives for the efficient use of existing infrastructure and sufficient provision of additional capacity. In this context, it is useful to look at the pricing decisions to be made at different levels in the hierarchy of networks: first, backbone providers have to settle charges for data transport across each other's networks. Second, backbone providers charge mid-level networks for access to the backbone on permanent, leased lines (so-called dedicated lines). Third, mid-level networks charge local area networks for access. Finally, Internet service providers charge users who do not need a dedicated line for so-called "dial-up" connections to the network which permit intermittent access at somewhat lower speeds. "Dial-up" connections are the typical Internet connection used by "normal" households, whereas large companies and organizations often have dedicated lines to local-area or mid-level networks.

The most frequently used pricing scheme for Internet services is flat-rate pricing (ITU, 1997a; McKie-Mason and Varian, 1997). This consists of an annual fee for a "fixed-bandwidth" connection, allowing for unlimited usage within the limits of the purchased bandwidth. Flat rates are typically applied down the network hierarchy from backbone to mid-level and from mid-level to local-area networks.

Until recently, and for historical reasons, pricing arrangements between Internet service providers were based on the principle "the sender keeps all" and did not include a settlement for the transportation of data over other providers' backbones. Consider the case of a data stream sent by user 1 who is connected by backbone A to user 2 who, in turn, is connected to backbone B. Under the "sender keeps all" system, neither 1 nor A would have to pay for the transportation of the data on backbone B. Today, however, some large providers do try to charge small providers for the "unbalanced" use of their networks. This charge is not based on the transported data volume, but rather on a specified level of capacity at which the small provider can feed data into the network of the large provider.

Flat rate pricing has a number of advantages for Internet service providers and users. It does not require expensive accounting of data flows, and the billing of users is relatively cheap. Flat rates are also close to the marginal costs for providers, as the costs of sending an extra packet are nearly zero most of the time. Flat rates also encourage the diffusion of the Internet amongst "dial-up" users, as the latter can use their existing phone connections and, therefore, do not incur additional costs from Internet usage. However, flat rates also have drawbacks. The main problem is that they do not provide an

¹²Providers typically have 50 per cent spare capacity on their networks during peak periods. Note that this spare capacity does not only serve to handle momentary bursts of traffic but also protects the provider from quick increases in demand, especially considering that it takes between 45 and 90 days to have a standard line installed (see Gareiss, 1997).

incentive to economize on Internet usage and consequently contribute to congestion. This is similar to the classic "tragedy of the commons". Because incremental usage of the network is free once the fixed fee has been paid, users tend to overuse the common resource compared to a situation in which the price reflects the relative scarcity of the resource. In this context, Internet usage of little economic value has the same consequences for network congestion as attempts to transmit an urgent and valuable piece of information, as flat-rate pricing does not allow the transportation of information to be prioritized on the basis of its value.¹³

Usage-based pricing could solve congestion-related problems, but obstacles include high administrative costs and user preferences

Various other pricing mechanisms have been proposed to prevent congestion and to promote a more efficient use of resources.¹⁴ Most of these involve pricing systems where users are charged for actual or potential usage. Usage-based schemes allow providers greater flexibility in terms of pricing, and under some of them, the price would remain zero if the network is uncongested. Users can benefit by purchasing only those network services where the value exceeds the costs. If appropriately designed, such schemes may facilitate the supply of differentiated services, improve the allocation of resources, and eliminate the problems associated with congestion.

The very limited application of usage-based pricing indicates several disadvantages. Accounting and billing costs in such schemes can be high relative to congestion costs. Experiences from the telephone sector have shown that overhead costs for usage-based billing can amount to 50 per cent of telephone bills. Settlement of line charges on the basis of actual data transmission between service providers can also be rather costly. Furthermore, experiences with usage-based pricing have not been very encouraging. Service providers in several countries, for example, Italy and the United States, had to abandon such schemes after customers flocked to rivals implementing flat rates (ITU, 1997, p. 21; Bailey, 1995). Usage-based pricing has been successfully introduced in New Zealand. However, this may be related to the fact that New Zealand had only one (high-cost) link to the Internet which induced customers to economise on usage time as they could not seek out alternative (flat-rate) service providers.

In summary, the current flat-rate pricing mechanism in most countries does not always optimize the use of Internet infrastructure, and more efficient pricing mech-

anisms which reduce congestion and information loss or which prioritize high-value information may be desirable. However, flat-rate pricing may reflect user preferences and the high administrative costs of more sophisticated pricing schemes. Furthermore, the resulting congestion may be a transient problem before technical progress provides new solutions regarding pricing and capacity.

Competition in infrastructure and access provision encourages Internet development

Economists typically agree that competition does a great deal to minimize costs, and thereby maximize benefits to consumers. The level and nature of competition between network and access (Internet service) providers, however, differs considerably among countries. In the United States, for example, competition among both types of providers is relatively fierce. There are, for example, at least thirty providers who now offer nationwide service over a backbone of high-speed circuits. Hence, charges closely match costs, with the caveat discussed above (Gareiss, 1997). However, in many other countries the number of backbone infrastructure providers is limited. This permits them (be they private or public) to use their market power to charge monopoly or oligopoly prices. In such cases, measures to strengthen competition and to bring prices closer to competitive levels would clearly be welfare-enhancing.

Lack of competition in infrastructure provision may be due to historical factors. In the past, infrastructure providers were assumed to be natural monopolies. Therefore, they were either in public hands or were strictly regulated. However, the situation is evolving rapidly, and competitive markets among infrastructure providers are a real possibility, at least in large markets, as witnessed in the United States. In the European Union, the deregulation of the telecom sector in January 1998 is expected to promote developments similar to those in the United States.

Empirical evidence also identifies deregulation and competition in the telecom sector as being key for future Internet development. In OECD countries, for example, the average price for leased line access to the Internet in countries with telecoms monopolies in 1995 was 44 per cent higher than in countries with competitive provision of infrastructure (OECD, 1996a). Competition is also important in the market for "dial-up" access. In fact, the considerable dispersion of Internet access charges (for both infrastructure and Internet service providers), as reported previously in Chart 4, reflects in part the varying degree of competition in domestic markets. Countries where competition is absent show, on average, more

¹³The problem can be compounded by users with high-capacity access lines. Already a limited number of such users can cause congestion if they feed large quantities of data into the system.

¹⁴However, there seems to be little consensus among economists on new pricing policies. McKie-Mason and Varian (1997) favour usage pricing, whereas Anania and Solomon (1997) support flat rates.

than twice the costs and only one fifth of the Internet usage of those with competition (OECD, 1996c).

Although competition in many areas of telecommunication and information technology may be growing, there are also reports of ever more mergers and acquisitions within and across these sectors. Infrastructure providers, for instance, have started providing Internet access.¹⁵ This development has been ascribed to the convergence of different types of infrastructure and information technologies towards more integrated systems, which, in turn, induced the integration of companies to take advantage of related economies of scale, react to uncertainty about future demand, acquire skills, and gain market power (European Commission, 1997a). These developments may pose new challenges to competition authorities worldwide.

Demand is growing rapidly with more and more users benefitting from expanding networks, and new and more sophisticated applications

Internet development seems to be strongly supply driven, as rapid technical progress has reduced costs considerably in the past (OECD, 1997g, p. 10). Nevertheless, demand also plays an important role in the development of Internet services. Demand for Internet services is determined by the number of users who want to be connected to the network and the rate of network usage. The rate of usage, in turn, is determined by the type of applications which are offered on the network and by the extent to which each application is used. The explosion of demand for bandwidth in the last few years is a consequence of both an increase in the number of users and the capacity required for new and more sophisticated applications.

Another factor determining demand is the existence of network externalities (Shy, 1995). Positive network externalities are the gains for existing network users from the entry of an additional user. The more users there are, the more interesting and useful a network becomes both to existing users and new entrants alike. Such externalities explain, for example, why local networks have been interested in interconnecting with one another.

Internet congestion, if prevalent, is also likely to affect future Internet demand. Users would probably be willing to pay a premium for the transmission of high-value data, if this would guarantee speed and reliability. If congestion is not dealt with, however, the Internet could lose some of this traffic to other instruments of data transmission.

Demand for Internet services depends on their price and on the price of complementary and substitutable goods and services

Internet pricing is important for demand in general. In the early days of the Internet, services were de facto free for most users, as they had free access to the Internet through governmental and academic institutions. This is changing rapidly with the increasing number of private and commercial users who pay for Internet access. For private "dial-up" users, the costs of local phone communications and the charges imposed by Internet service providers affect demand. Lower charges for local calls and for access to the network through service providers should, for example, induce an increase in the number of users. Commercial users with "dedicated" lines would also benefit from lower line leasing charges.

Liberalization of the telecommunications market may go a long way towards lowering average telecommunication charges and, thereby, stimulating demand for Internet access. However, it may not necessarily result in lower prices for local communication (to benefit "dial-up" users) in the short run. In Europe for instance, telecom monopolies argue that they have been forced to subsidize local calls by governments pursuing "universal access" policies, and that liberalization now forces them to rebalance their prices so that they reflect true costs. Also, liberalization of telecom services may increase competition in the market for long-distance and international services, and line leasing, much more than in the market for local calls.¹⁶ In the long run, competition in the market for local network connections is likely to be stimulated by the development of new technologies. Cable TV lines, for example, are already able to carry Internet data, and electricity lines will be tested for this purpose in the course of 1998.

The total costs of Internet access and usage do not only include the charges for connecting to a local service provider and for using the local telephone line. Users also have to acquire complementary goods, i.e., hardware and software, which determine demand for Internet services. Access to the Internet, for example, normally requires a personal computer. This is still a costly purchase, which explains in part why the penetration rate of personal computers is generally still limited. However, increased competition in information technology is likely to lead to further technical progress and price reductions. Furthermore, new technologies are being introduced which extend the capacity of the television and the telephone to supply Internet applications.

Demand for Internet services also depends on the price of substitutable services. For a very long time, the Internet was used mainly for electronic mail. Electronic

¹⁵See European Commission (1997a) for more examples of vertical and horizontal integration.

¹⁶In the United States, prices for local calls declined between 1992 and 1997 despite the fact that competition in local markets is still limited. But pressure to increase the price of local calls is increasing. See Wall Street Journal, 3 December 1997.

mail is a relatively close substitute for the telephone, the telefax, and regular mail. Once connected, communication through electronic mail is virtually free of charge, which is not true of its substitutes. Similarly, the success of Internet fax and Internet phone is due to the price difference as compared to its "conventional" competitors. Other things being equal, a reduction in the prices of traditional telephone, telefax or mail services would reduce the incentive to use the Internet.

B. The economic effects of electronic commerce on user industries

The expansion of electronic commerce on the Internet is not only related to progress in infrastructure and access opportunities. It also depends on the emergence of profitable business opportunities. For business purposes, the Internet opens possibilities which go much beyond existing information/communication technologies. All the elements of the value chain of certain transactions from production to distribution can in principle be conducted online. The Internet offers integrated fax, mail, and (soon) phone services at relatively low cost. It allows interactive or non-interactive transactions between just two or many individuals. Finally, the Internet allows the transfer of digitalized information from one computer to another at a low price (see also Tables 6 and 7, and Chart 3, previously listed). This makes the Internet a very versatile and powerful instrument of electronic commerce, despite the fact that the commercial use of the Internet only began a few years ago.

The Internet reduces transactions costs

Two effects of electronic commerce on user industries are most frequently cited. The first involves the impact on intermediaries and changes in the supply chain between the design of a product and its final sale to a customer. The second effect concerns market structure. It is often argued that the Internet is the "great equalizer" in that it will allow small firms to compete with big firms on an equal footing, thereby resulting in increased competition. Both these effects are in fact the result of lower transaction costs, arising from faster and cheaper information flows and communication.

The Internet allows firms to perform certain activities at lower cost. The efficiency gains here result from improved internal organisational and management efficiency of enterprises (through faster and cheaper communication), as well as from increased competition between suppliers. The Internet also has the potential to improve the quality of a service by allowing for more rapid adjustment of supply to changes in demand, faster product development and market testing, and an increased ability to customize client needs. A number of prominent examples of the benefits from electronic com-

merce on the Internet have been reported, as a number of companies have successfully introduced an EDI- and Internet-based purchasing system, with considerable savings in terms of turn-around time and supply costs (see also the previous section). Internet-based electronic commerce has also made some inroads into retailing of high tech products with an increasing number of companies selling such products via the Internet (ITU, 1997a).

Internet-based electronic commerce can change the structure of firms and sectors

The Internet is also likely to affect the "vertical dimension" of firms. Any product is a combination of goods and services. Consider, for instance, a book in a shop: it includes the author's ideas, the paper on which it is printed, the services of a cover designer, marketing specialists, a publisher, a transport firm and a retailer. The providers of these goods and services can either be part of a single firm which controls the whole chain between writer and reader, or they can consist of several specialized firms. The extent to which goods and services are produced "in house" by a single firm is referred to as the "vertical dimension" of a firm.

The Internet may affect the "vertical dimension" of firms through its impact on the costs of communicating and transmitting information. Firms integrate or splinter in order to become more efficient (or to gain market power). The availability of new information and communication technologies creates new conditions which induce adjustments in various sectors. Consider, for instance, the case of financial services. The Internet has facilitated access to information on financial markets through free access to online information services. Brokers who used to sell integrated services (i.e., the trade and information for the client on what to trade) now find themselves competing with online brokers who simply conduct trades and provide no advice or information. Online competition here has resulted in less differentiated services competing purely on price, rather than on the quality of the service (as reflected by the value of the background information). The result has been vertical disintegration, i.e., the separation of information service provision from actual trading activity.

Similar changes have affected travel agents, though sometimes with an opposite effect in terms of vertical integration. The Internet sale of airline tickets is much less expensive than conventional ticket sales through a travel agency. Airlines are, therefore, trying to circumvent travel agencies and sell directly to customers in order to avoid paying commission. Alternatively, airlines can try to sell through online agencies at a discounted commission. The expansion of online ticket sales, however, is constrained by regulations which prohibit price reductions. Consequently, Internet customers cannot benefit

from lower ticket prices. This leaves airlines with a strong incentive to integrate sales activities into their own operations.

Profound changes can be expected in the retail sector as a whole, as the Internet facilitates shopping from home. Already, a first wave of "cybermalls" has been followed by more successful specialized retailers, and, more recently, multi-product "megastores" have appeared (The Economist, 1 November 1997). However, much uncertainty remains as to the type of Internet shopping which will ultimately prove successful. But this is hardly surprising given the relative novelty of Internet shopping. Experience gained so far has shown that firms cannot simply replicate existing formulas, and that they have to design new methods if they wish to sell on the Internet. This applies not only to the retail sector, but also to many other sectors which try to sell existing or new goods and services online.

The spread of the Internet and continuing expansion of information available on the Internet is likely to change fundamentally the market for information. This is because consumers may be willing to pay a premium for higher quality information, and firms may specialize in collecting and processing information for consumers or firms. A new information processing industry may, therefore, emerge.

The Internet facilitates market entry, thereby benefitting small and medium-sized enterprises

A number of economists have argued that the Internet will affect market concentration and increase competition via the "easy" entry of new competitors. This, it is argued, benefits in particular small and medium-sized enterprises. First, the capital cost of entry, i.e., the costs to "set up shop" on the Internet, is relatively low compared to conventional outlets. Second, the cost of establishing a reputation in the new environment is also lower than for established markets, and somebody with a bright idea can supposedly make an enormous impact with only a limited upfront investment. Examples of this may be found among a number of specialized Internet retailers. However, each success story is accompanied by many more failures, and the actual cost of setting up a successful business on the Internet is probably higher than is generally believed. Also, market entry may be more restricted than first thought. One reason could be lack of competition in "upstream" industries which supply Internet merchants. As regards the music industry, for example, it has been suggested that control of the market by just a few companies has limited price cuts on the Internet, which, in turn, has thus far limited the growth of online compact-disc stores (The Economist, May 10, 1997).

The demand for Internet-based commerce will be boosted by lower transaction costs, such as search costs, delivery time and charges, and travel costs

The demand for goods and services provided through all (electronic and non-electronic) means will be affected by the advent of the Internet. First, the Internet can reduce search costs compared to other electronic or conventional means of commerce. Consumers typically do not have complete information about the price and quality of goods they are considering to buy. The cost of acquiring more information can be fairly high if one has to make a number of phone calls or browse through various papers. Powerful Internet search programs can now help customers find the cheapest offer among a large range of suppliers in a short period of time.

Furthermore, consumers can benefit from reductions in other transaction costs. All products which can be digitalized can, in principle, be distributed through the Internet. This enables consumers to buy from suppliers located all over the world and have their purchases delivered at near zero transportation costs. Moreover, the cost associated with the delay between order and delivery is reduced. We mentioned above that ordering and payment costs for Internet transactions are typically lower than for most other means of commerce. A number of service industries are also likely to benefit from lower transaction costs, as online supply does not necessitate physical interaction between buyer and seller. A builder, for example, may not have to travel to see his architect if he can access required plans via the Internet. The producer of a product may not have to meet physically with the designer of a product.

Some economists, however, have been more sceptical about the possible savings in transaction costs. Search costs are not always as low as suggested. Finding the appropriate information requires skills which can be costly to acquire. Also, searching might take some time, particularly when the network is congested. Relying on only one source of information, such as a single "search engine" (search program) or online travel agent, may also provide biased information. In addition, transaction costs may be affected by the fact that the rules and laws governing commerce on the Internet are not yet in place, an issue we will return to at a later stage in this study.

Certain sectors may also experience considerable increases in demand indirectly through the expansion of the Internet. Industries which supply inputs to the Internet, such as the information technology industry in particular, are likely to experience growing sales. Computer training is likely to be another sector benefitting indirectly from growing electronic commerce.

Lower transaction costs will stimulate competition, both domestically and internationally, resulting in more diversity, better quality and/or lower prices

What is the likely outcome of changes in demand and supply conditions through Internet-based electronic commerce, and how will this ultimately affect markets and consumers? The greatest benefits will probably derive from lower costs in the various areas discussed above. These, in turn, will enhance competition through cheaper communication and information, bidding and tendering, and market entry. In such an increasingly competitive environment with ever more integrated markets, suppliers are likely to respond with greater diversity, better quality and/or lower prices.

The impact of the Internet, however, will not only be felt at the domestic level: international trade and competition are likely to benefit as well. The Internet facilitates international advertising and price comparisons. Transportation costs for digitalized products will fall close to zero, thereby benefitting high-cost international delivery disproportionately. Many producers will also be able to locate production much more independently from the location of their customers. This is why it is claimed that small companies and poor countries, especially, can

benefit enormously from Internet-based electronic commerce.

As information and communication are inputs into almost all production and distribution processes, all industries and markets will be affected in one way or another by the growth of electronic commerce on the Internet. It should, however, be emphasized that forecasts for the future growth of electronic commerce and the likely effects on different markets are difficult to make with confidence. Consider, for example, the prediction that the retail sector will change considerably. This depends on the assumption that current trends continue. However, consumers may react very differently from what is predicted, and decide that they prefer the "shopping experience" of physical stores and malls to the anonymous world of cyberspace. On the other hand, new technology may even accelerate the shift towards online transactions if major savings are involved in terms of money and time, and if the Internet instills a new sense of "having fun" with shopping. Despite this uncertainty, we should expect and welcome the rising importance of electronic commerce and the Internet in the future. Building on this discussion, the next section will study in more detail some of the quantitative and qualitative implications of growing electronic commerce.

IV. The Growing Importance of Electronic Commerce

A. Electronic commerce in numbers

Commercial transactions conducted by telephone, fax, ATM, credit cards or television have received considerable attention over the past decades, and the economic importance of these media has grown. Whilst they have had an enormous impact on the way we communicate and do business, their proliferation has, nonetheless, been relatively gradual, leaving producers and consumers time to adjust to the changing environment. Internet-based electronic commerce, we have argued, is yet another, large step towards more versatile, faster and cheaper electronic commerce. The previous section has shown that the Internet offers considerable economic benefits through new ways of conducting business and through new, cheaper and better products. This section looks at the quantitative and qualitative implications of growing electronic commerce in more detail. In this context, one should recall the enormous potential for Internet user growth, as suggested by Table 3 above. The number of telephone lines and cellular connections worldwide is likely to reach 1.4 billion by 2001, and there are already more than one billion television sets in active use. All these connections to telecommunications infrastructure can potentially be used to link up with the Internet. Already, the number of Internet users is likely to increase 5-6-fold from 60 to about 300 million between 1996 and 2001, and significant potential for further growth remains.

A quantitative analysis of electronic commerce has to be seen in the light of definition problems and lack of data

Assessing the quantitative economic importance of "electronic commerce" quantitatively requires a definition of what should be counted under this term. If payments by credit card are included, electronic commerce would indeed be very large already. However, the payment stage is only one element of a commercial transaction. A key element is the acceptance of an offer through an electronic channel. Statistics on electronic commerce, therefore, typically look at such purchasing decisions and report sales or revenue through electronic channels. As noted, only the Internet allows all elements of many types of commercial transactions to be conducted electronically. But most electronic commerce is conducted through a combination of electronic channels (for example, telephone plus television or Internet plus telephone), in combination with paper (phone and mail), or in conjunction with physical shopping or delivery. Therefore, statistics on the sales revenue acquired through certain instruments of electronic commerce and other means of purchasing do not always reflect the full

importance of each instrument for a commercial transaction as a whole.

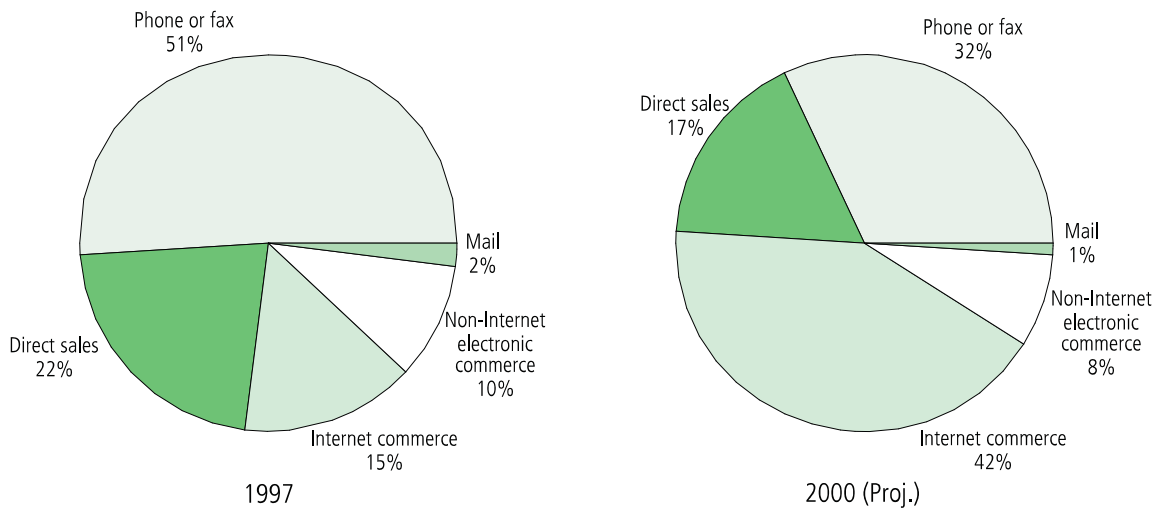
Another limitation of data on electronic commerce is their short historic record and the highly speculative nature of all forecasts. Consequently, we observe huge differences in the current numbers and forecasts for the different instruments of electronic commerce, and especially regarding the Internet. Data collection also focuses largely on the United States and some other main regions, and numbers for cross border transactions are unavailable.

Internet-based electronic commerce is growing rapidly, possibly accounting for two per cent of all commercial transactions in the industrialized countries within 5 years

One set of projections on electronic commerce suggests that by 1999, 13 per cent of all consumer "shopping" will be conducted electronically, and that this share will double to 26 per cent by 2007 (Financial Times, September 3, 1997; The Economist, May 10, 1997). In particular, the Internet is expected to expand its market share from 2 per cent of all electronic sales today to about 50 per cent in ten years time. Another set of projections suggests that the telephone is by far the most important instrument of electronic commerce today whilst the Internet, intranets (for example, networks within one company), and EDI account for only 6 per cent of all electronically initiated sales. However, by 2002, Internet and other network-based commerce will comprise one quarter of all electronic sales. A survey by Forrester Research revealed that companies which already sell their products on the Internet still conduct over half of their sales by the telephone or fax. The Internet accounts only for 15 per cent of their sales revenue (Chart 5). However, the share of online sales is projected to grow to 42 per cent of all sales for these companies by the year 2000 (Forrester Research, 1997).

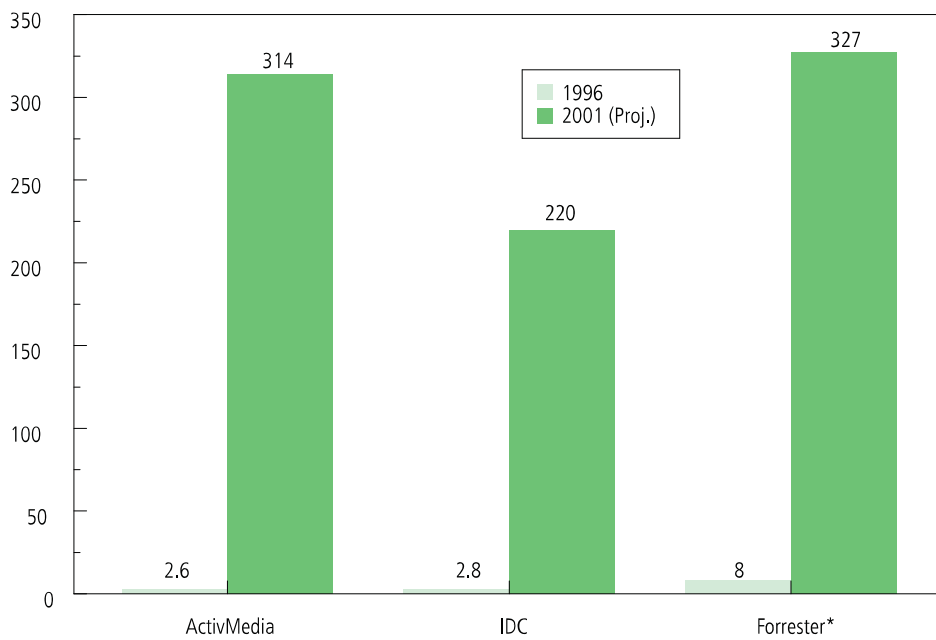
The dramatic growth of Internet-based electronic commerce projected for the next five years is illustrated by Chart 6. For 1996, ActivMedia and IDC (two Internet research companies) report sales of US\$ 2-3 billion via the Internet throughout the world. This may seem low but it compares to zero sales only a few years back. In 1997, Forrester Research estimates that U.S. Internet sales will reach US\$ 8 billion. This is only about 0.1 per cent of all economy-wide sales. In the next five years, Internet sales are expected to double each year. ActivMedia and IDC project worldwide sales of US\$ 200-300 billion by 2001. Forrester Research estimates Internet-based commerce in the U.S. of US\$ 327 billion by 2002. This means that 2.3 per cent of

Chart 5. The Relative Importance of Commercial Channels for Companies Already Trading on the Internet, 1997 and Projection for 2000



Note: Based on a survey of 63 companies by Forrester Research Inc.
 Source: Forrester Research, Inc., 1997.

Chart 6. Value of Web-Generated Sales Worldwide, by Selected Research Companies, 1996 and Projection for 2001



* Data from Forrester Research refer to 1997 and 2002 for U.S. only.
 Source: ITU, Challenges to the Network, 1997a; ActivMedia, 1997 (<http://www.activemedia.com>);
 Forrester Research Inc., 1997 (<http://www.forrester.com>); IDC, 1997 (<http://www.idcresearch.com>).

Table 8: United States Internet Commerce Revenue, by Sector, Projection for 2002

	Internet sales 2002 (Proj.)	
	in \$ billion	in % of economy wide sales, by sector
Total	327	2.3
Manufacturing	116	2.3
Wholesale and business retail	168	3.1
Utilities	10	1.8
Services	33	1.3

Source: Forrester Research Inc, 1997.

all U.S. sales will be conducted over the Internet (Table 8). It should also be noted that these figures underestimate the importance of the Internet: half of the Internet users in the United States and Canada base their purchasing decisions on Internet-related information, but only 14 per cent of these users so far carry out transactions via the Internet.

The United States dominates Internet commerce but other regions are catching up

It is also interesting to look at the regional distribution of Internet activities. About 70 per cent of Internet websites are located in the United States; another 8 per cent are reported for Canada, 14 per cent for Europe, 4 per cent for Asia/Pacific and 2.3 per cent for Latin America and Africa. However, Europe, Asia and the other world regions are likely to catch up in terms of Internet sites and users in the coming years. Chart 7 illustrates that Africa, Asia, and Latin America have reported the highest growth rates for the period between 1993 and 1996, and all regions outside the United States are expected to gain market share over the next 3-4 years (Chart 8). The share of Internet users from Europe and Asia in the world, for example, is likely to grow to 25 and 15 per cent, respectively, by 2000 (ITU, 1997a).

Internet-generated revenue is regionally even more concentrated than the number of websites. Over 85 per cent of world revenue in 1996/97 was generated in the United States, whereas the United States' share of users only amounted to 62 per cent (ActivMedia, 1997). By 2001, however, the share of European web-revenue will have more than doubled from about 5 per cent to over 10 per cent of total online sales (IDC, 1997).

Electronic commerce online is affecting business commerce most strongly, speeding up transactions and lowering costs

Electronic commerce and the Internet will have a significant impact on various economic actors and sectors. Most growth of Internet commerce is expected to be among businesses. EDI, with gateways to the Internet, in particular, is projected to grow rapidly, and total EDI-based revenue may reach over US\$ 60 billion in 2000 (from only US\$ 200 million in 1996) as firms take advantage of cost reductions and productivity gains. Revenue from sales to individual consumers online may reach US\$ 50 billion, or about one fifth of total online sales of US\$ 200-300 billion predicted for 2001. However, the variance of estimates across research institutes is enormous. Assuming the figure of US\$ 50 billion is realistic, this would amount to 75 per cent of US catalogue sales in 1996, and 2-3 per cent of US retail sales for 1997 (OECD Observer, 1997). Expectations in regard to the proliferation of Internet commerce are high, with up to 70 per cent of retailers in the United States and the United Kingdom expecting orders on the basis of their web-pages by 1999.

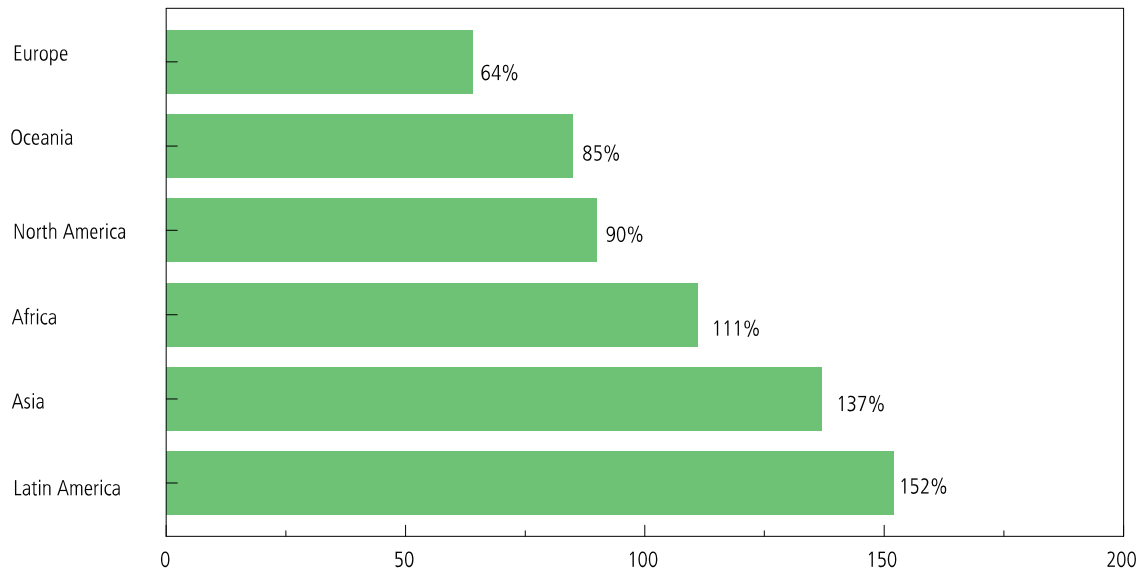
The Internet is likely to boost growth in telecommunication services, information technology and many other service sectors

Value-added through the Internet is an interesting indicator of the growing economic importance of electronic commerce. In 1996, value-added through the Internet in the United States probably amounted to about US\$ 10 billion, or 0.1 per cent of GDP. By 2000, Forrester Research expects that value-added through Internet access and infrastructure services, online financial services, and other services provided via the Internet may reach US\$ 100 billion or over 1 per cent of GDP in the United States. This means that in a few years' time, the Internet will become an important economic sector in itself.

We noted above that the evolution of the Internet and the growth of electronic commerce are likely to have particularly strong effects on the telecommunications and information technology sectors, as well as a number of other service sectors which can conduct transactions through the Internet. In fact, 25-30 per cent of economic activity in industrialized economies is likely to be strongly affected by electronic commerce. This is the combined share of the value-added of the wholesale and retail sectors, financial services and business services (without real estate), educational, recreational and cultural services, and entertainment industries in countries such as Canada, the Netherlands, Sweden or the United States. Other sectors, for example manufacturing, are

Chart 7. Growth of Internet Hosts, by Region, 1993-1996

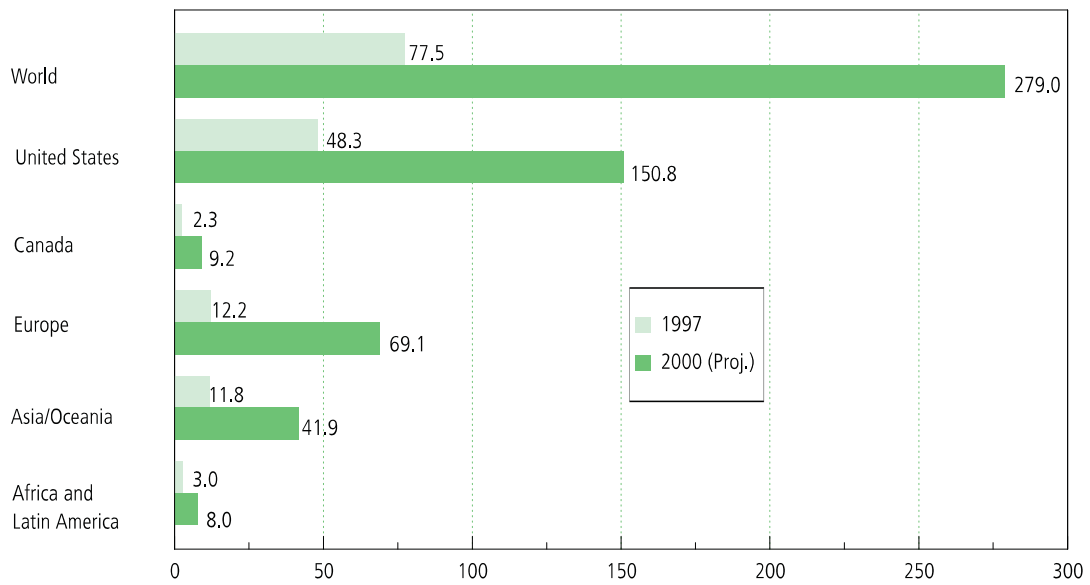
(Percentage average annual growth)



Source: ITU, World Telecommunications Indicators Database, 1997b.

Chart 8. Internet User Population, by Region, 1997 and Projection for 2000

(Millions)



Source: ActivMedia, Incorporated, 1997; (<http://www.activmedia.com>).

also likely to experience change in business practices and communication patterns.

Data on the growth implications of electronic commerce are unavailable, but a few sources discuss the growing importance of information and communication technologies and their contribution to economic growth. In Japan, the share of new information and communications technologies in GDP is estimated to increase from less than 1 per cent in 1993 to about 2.5 per cent of GDP by 2010. For the European Union, the cumulative contribution of the emerging information economy to growth is projected to reach 3-7 per cent of GDP between 1993 and 2008 (OECD, 1997h). In fact, the communications sector (which includes much of the electronic-commerce-related activities) has posted the highest productivity gains of all sectors during the past 20 years. Productivity growth averaged 4.6 per cent per annum in this sector over the 1977-93 period in the OECD. This compares to an economy-wide annual productivity gain of only 0.8 per cent.

The value-added created through electronic commerce and the Internet, and the indirect effects on other sectors are likely to generate much new employment. The infrastructure and information technology sectors, which enable companies and consumers to access the Internet, will need computer programmers and website producers, Internet service providers, and other personnel to service users in a rapidly changing environment. In the United States, Internet-related employment reached almost 400,000 in the first quarter of 1997 (OECD, 1997j). Furthermore, new sectors, such as online publishing are emerging, and other sectors such as financial or entertainment services are likely to find their businesses stimulated by Internet-induced lower prices.

However, employment growth may not benefit all economic sectors equally, and we mentioned above that some sectors are likely to be transformed radically. "Traditional" retail or wholesale business with various kinds of sales agents or shop clerks may make way for a new generation of middle-men in electronic commerce. So-called "platform businesses" are emerging as intermediaries between producers and buyers. They take responsibility for setting up a web page, advertising, subscribing to a secure and reliable payment system, and organizing the delivery of purchases. They help search for business partners, provide a standardized interface for easier communication, and help find agreement on price (Kokuryo and Takeda, 1995). Some changes are also likely to affect the organizational structure of companies. Administrative jobs in accounting, purchasing, personnel, and internal communication could disappear, as the

Internet allows for automation or outsourcing of some of these services.

B. Electronic commerce and the telecommunication and information technology sectors

Considerable new infrastructure investment and infrastructure upgrading will be necessary to accommodate future growth of electronic commerce

Growing demand for access to telecommunication networks and for electronic commerce will stimulate activities in the information technology and telecommunications sectors. The growth in telephone lines and cellular subscribers, and expansion of the cable TV network predicted for the near future will result in major infrastructure investments in both industrialized and developing countries. In fact, the present proliferation of telephone and television in industrial countries illustrates the enormous latent demand for infrastructure in developing countries. In addition to new infrastructure investments, an upgrading of much of the existing network will be taking place in the future. As applications become more sophisticated, the amount of data to be transmitted will grow and so too will the bandwidth requirement for individual lines and the network as a whole. A large share of telephone lines, for example, is based on copper lines with analogue transmission of data. Over time, these will have to be replaced by digital lines and fiber-optic cables. The latter have a much larger bandwidth than copper: a fiber-optic cable as thick as one hair can transmit an edition of the Wall Street Journal in one second.

Significant new investment is likely in high- and low-orbit satellite networks which allow wireless phone and Internet connections.¹⁷ Poor or remote areas, in particular, may find it worthwhile connecting to the telecommunication infrastructure via satellite rather than via cable. Cable networks require a large number of subscribers to be economical, and take years to install. For a satellite connection, initial investments can be limited to setting up a base station plus a switching and control unit, and access can be gained within just a few months (Zhang and De Dante, 1997; Kohn, 1997). Developing countries may find emerging satellite technology particularly interesting, as it could allow them to "leap-frog" into the new "information age" by skipping the stage of copper and other cable networks (Primo Braga, 1997).

¹⁷High-orbit satellites are most useful for non-interactive text and image transmission, as the distance between the satellite and the users introduces a signal-delay. This makes it less suitable for interactive communication. Even though signals travel at the speed of light, it would take 0.2 seconds to bridge a combined distance of 60,000 kilometres between the sender, the satellite, and the recipient of a signal. This can be quite disturbing, for example, in a telephone conversation. Low-orbit satellites are more useful for voice communication because they have shorter delays in the transmission of sound, but the technology is still evolving.

Table 9: Internet-Generated Revenues in the United States, by Sector, 1996 and projection for 2000

	1996		2000 (Proj.)	
	million \$	percentage	million \$	percentage
Internet access related equipment and services	4,010	27.0	29,510	15.0
Hardware	2,840		19,820	
Software	270		5,540	
Service	900		4,150	
Internet access	4,230	20.5	33,130	17.0
Consumer	3,460		17,350	
Business	770		15,780	
Business-to-business commerce	600	4.0	66,470	34.0
Consumer retail	530	3.6	7,170	3.5
Financial services	240	1.6	22,580	11.5
On-line securities/mutual fund fees	220		3,090	
On-line insurance purchases	0		18,630	
On-line consumer banking fees	20		860	
Content (various services)	5,240	35.3	37,280	19.0
Consumer	80		4,800	
Business	5,160		32,480	
Total U.S. Internet economy	14,850	100	196,140	100

Source: Forrester Research Inc, 1997.

Rapid growth of electronic commerce and the Internet will stimulate demand for hardware, software and related services

Access to electronic communication and commerce requires hardware, software and an access ramp to the telecommunication infrastructure. This is relatively simple and inexpensive for a telephone, fax or television. However, Internet access still requires more sophisticated equipment, including a personal computer, modem, access software and an Internet service provider. If the Internet is to grow as rapidly as projected, these requirements will provide a considerable boost to the information technology sector. In fact, a whole industry has specialized in producing hard- and software, consulting users, servicing their equipment, and building Internet sites. As the number of personal computers doubles from 245 million in 1996 to an estimated 450 million in 2001, and as many existing computers become obsolete, a huge market will have to be supplied.

The search for cheaper access to the Internet is underway. It was noted above that due to technological progress, future mass access to the Internet may not lie with personal computers. It is conceivable that relatively inexpensive equipment linked to a television receiver and using powerful cable TV lines will replace computers for this purpose in a few years' time. Alternatively, a simple machine with Internet and word processing functions, which would be sufficient for most people's electronic da-

ta processing needs, could provide affordable mass access to the Internet through telephone lines in the future.

A growing share of commerce in Internet-related equipment and services will be conducted electronically

Sales of equipment and services to gain access to the Internet are expected to experience strong growth as electronic commerce expands. Furthermore, a growing share of transactions in these sectors are likely to be conducted electronically, as they are very suitable for electronic commerce. We mentioned that computers and software are increasingly ordered online, and software can be downloaded (delivered) through the Internet. Services to build websites and communication systems, and customer services such as installation assistance or trouble-shooting, can also be obtained via the Internet. Table 9 illustrates the rapid growth in online spending on equipment and services. Total expenditure on hardware, software and services is projected to increase from US\$ 4 billion in 1996 to almost US\$ 30 billion in 2000, according to Forrester Research. Internet access expenditure, i.e., fees to Internet service providers, is expected to grow from US\$ 4.2 billion in 1996 to over 33 billion in 2000. Consumer spending for Internet access is expected to increase five-fold, compared to a twenty-fold increase in business spending. This is consistent with the projected strong growth in Internet-based electronic commerce among businesses.

C. Electronic commerce and its impact on user industries

Electronic commerce will transform business-to-business commerce and retailing

The strong growth of electronic commerce in the business sector is not only reflected in Internet expenditure on equipment and access but also in business-to-business transactions. Forrester Research projects a 100-fold increase for this type of electronic commerce from US\$ 0.6 billion in 1996 to US\$ 66.5 billion in 2000 (Table 9), as companies find, for instance, the online purchase of supplies profitable.

We also mentioned above that electronic commerce is likely to have a strong impact on the retail sector, with the emergence of new types of online, "cyber", or "virtual" stores. Online-vendors of flowers, books, cars, music, computers or software, and even groceries have been making some inroads into traditional retailing through specialization on certain items or product lines.¹⁸ Online bookshops have attracted business by offering a service package based on books, including book reviews and comments, and discussion groups. Electronic purchases of books and other products also allow an easy tracking of buying patterns, and sellers can target advertising and information to customers on the basis of their revealed preferences. Projections for online sale of customized products are particularly optimistic. "Normal" retailers have to sell standardized products. The Internet may extend the reach of affordable customized products to clothes, cars, or furniture. Goods for people with special interests (e.g., certain hobbies) may not be available outside specialty stores. The Internet can significantly extend the reach of sellers and buyers of such products. Specialized Internet-based retailers are, therefore, expected to become quite successful: by the year 2000, eight per cent of books might be purchased online, and some 25 per cent of all car sales might be determined through information provided on the Internet (The Economist, May 10, 1997).

Despite the success of some specialized retailers, many "online shops" and "shopping malls" have been struggling with low profitability in the past. New attempts to capture a larger share of the retail market are being made through "megastores" (The Economist, 1 November 1997). These offer the shopping potential of a whole mall, with as many as one million items, covering up to 95 per cent of people's retail needs in a single website. At the same time, websites specializing in the search of the cheapest car, airline ticket etc. are also emerging. Such sites operate without any inventory, merely placing

orders for customers on the basis of the lowest bid received. Whether small and specialized, mega-sized, or simply searching the Internet for the cheapest offers, "Internet shops" hope to thrive on lower storage costs, more rapid turnover, cheaper suppliers, and better market information. Some Internet retailers offer additional services, such as home delivery. Nevertheless, retail shopping is expected to remain largely in the hands of traditional (physical or electronic) outlets: Forrester Research projects consumer retail online in the United States to reach only US\$ 7.2 billion by 2000.

It is unclear as to exactly what the effect of the Internet will be on catalogue shopping. On the one hand, catalogues are a superior means of presentation, and catalogue companies could facilitate advertising and ordering by opening a website. Catalogues and the Internet would then complement each other. On the other hand, much catalogue business could be transferred to the Internet.

Internet trade in products which can be delivered electronically are likely to see much growth

Products which can be delivered electronically are predicted a bright future. Online sale and downloading of software is mentioned most frequently in this context. Chart 3 above illustrates the considerable cost savings from conducting such transactions electronically. Competition is likely to force sellers to pass on these savings to consumers, who will also benefit from much faster delivery time. In fact, software ranks first among all goods and services retailed on the Internet (E-Land, 1997). Other sectors with potential for online distribution include publishing of newsletters, newspapers and magazines. Music and films (which have started to be sold online but delivered in a conventional manner) may soon be downloadable directly onto one's computer or multimedia system at home. Online music sales may reach US\$ 500 million by 2000.

Financial services and telecommunication services will proliferate on the Internet

Electronic commerce is also likely to transform a number of other service sectors. The strongest impact is expected to be on financial and telecommunication services. Many banks already report a majority of transactions being conducted electronically without personal contact between client and bank employee, and electronic stock and currency trading, or electronic settlement of payments is well-established. A rapid growth in online banking, security brokerage, and insurance services is forecast for the future. Asset management via the

¹⁸The retail sector, however, should not only see the Internet as a new competitor. It can benefit from the medium and raise productivity with the help of the Internet. Internet-generated information about customers may facilitate demand forecasting. Customer service on the Internet can help both online and traditional retailers to improve customer relations and service.

Internet, for example, is expected to quadruple to US\$ 474 billion between 1996 and 2000, as online brokers of stocks, bonds and various insurances are likely to replace some of the traditional agents. Estimates for value-added online in this sector vary considerably, but Forrester Research projects that fees on securities trade, banking and insurance purchases will exceed US\$ 22 billion by the year 2000 (Table 9).

Potential cost savings in the financial services sector are enormous: while the administrative (marginal) cost of clearing a check average US\$ 1.20, and for a debit or credit card payment US\$ 0.40 - US\$ 0.60, the transaction costs for an Internet payment can be as low as one cent. We mentioned that the costs for establishing an Internet site are also normally much lower than those for a full-fledged retail branch. The full cost of an Internet transaction (US\$ 0.13) is only half the cost of PC-based banking and one eighth of the cost of a transaction made over a bank counter. With such potential cost-savings from Internet banking, competition for banking customers is likely to increase considerably to the benefit of consumers, as many services such as checking accounts or loans are very price sensitive. Moreover, the Internet allows for easy comparison between suppliers (Dahl and Lesnick, 1995). As previously noted, Internet-based electronic commerce may cause the structure of whole market segments to change, for example, in the area of brokerage services.

Almost all financial institutions are projected to have a website offering basic services by the year 2000, and 42 per cent plan to offer advanced Internet services such as online bill payment and balance inquiries (Booz, Allen and Hamilton, 1997a). Demand for online banking services is also likely to increase rapidly. In 1997, only one per cent of United States households conducted Internet banking. This share is expected to grow to 16 per cent of households (accounting for 30 per cent of banks profits) by the year 2000 (Booz, Allen and Hamilton, 1997a).

In the telecommunications sector, the provision of mail by Internet is by now well-established. However, with improvements in technology, Internet telephony and Internet faxes are starting to compete with established service providers, especially government monopolies. Already, the quality of Internet phone services is considered better than cellular phone service while the costs are much lower. Beltz (1997) reports that as much as 20 per cent of US corporate Internet traffic in 1997 might be accounted for by voice communication. By 2001, US\$ 2 billion, or 4 per cent of total US long distance voice telephone revenues may come from Internet telephony. Charges for the latter could fall to one cent per minute for certain domestic calls and 10 cents per minute for international calls. Internet faxes are also likely to cost on-

ly a fraction of "conventional" faxes. Internet telephony and faxes are less costly as providers can lease lines "in bulk" and as "packet switching" allows more efficient bandwidth utilization than conventional telephony by a factor of between three and four.¹⁹ In light of these challenges, Japan has liberalized the provision of services through the Internet, and in Germany, Deutsche Telecom is experimenting with Internet telephone services (Beltz, 1997).

Advertising, travel, professional services and government will move online

Advertising on the Internet is also expected to grow rapidly in the coming years, as the reach of each advertisement is unlimited in principle. Internet-based advertising revenue increased tenfold from less than US\$ 20 million in 1995 to US\$ 150-200 million in 1996. Many companies offering Internet advertising are profitable (ActivMedia, 1997). However, the role of Internet advertising also has to be put into perspective: by the year 2000, three quarters of advertising spending will still fall on television, print media and direct mail, against 2 per cent on the Internet. As the computer screen is a poorer presentation medium than paper or the television, advertising experts predict that Internet advertising will require a higher information content to attract customers than will advertising in other media.

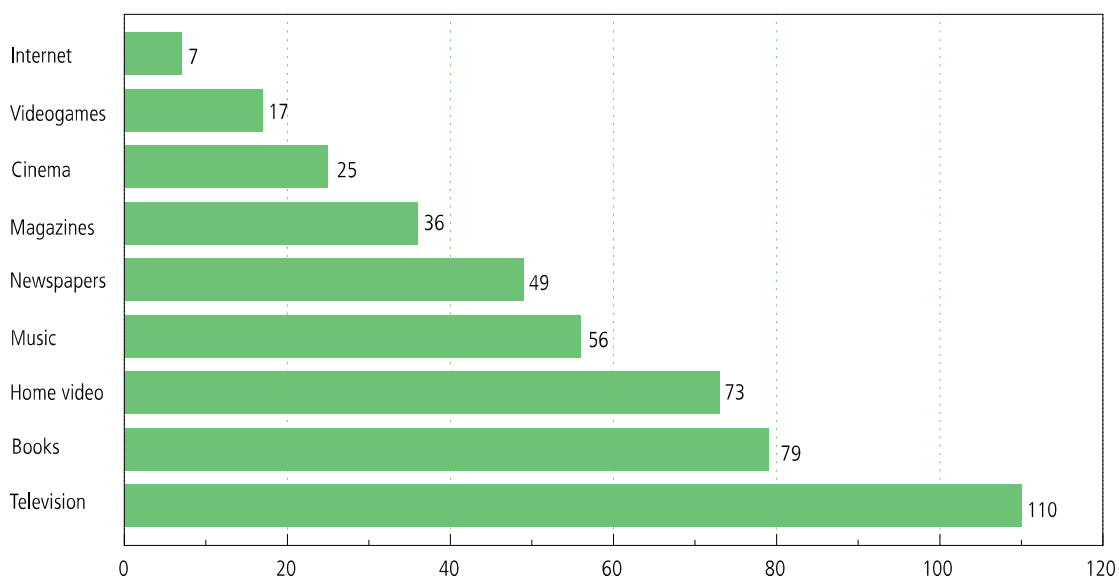
Web-advertising will never replace TV-based mass-advertising or one-on-one personal advertising but it may capture much of the market segment in between. Today, medium-sized target groups of perhaps a few thousand people receive mailings which are relatively expensive and often poorly targeted. Internet-advertising reduces costs and may, if good information about customer profiles can be generated, allow a better targeted campaign.

Advertising revenue is part of services revenue which Forrester Research projects to grow to almost US\$ 40 billion by the year 2000 (Table 9). Other service sectors which can generate revenue online include, for example, news and information services (e.g., databank retrievals, wire services online), education and medical services, legal services (for example, for disputes over electronic commerce or legal advice), architectural services, accounting, and various entertainment services.

Education and medical services online are expected to become very important. Classes and educational material through the Internet could be used to support public and professional education in industrialized and developing countries. Telemedicine and Internet medicine will allow remote diagnostics, monitoring and outpatient care. Electronic diagnostics, electronic billing or preventive care online are expected to reduce health care costs and

¹⁹As mentioned above, Internet messages are sent in the form of packets of information. This allows the Internet to work even when the infrastructure is overloaded (unlike a telephone line which is simply busy), but it can create small (but noticeable) delays as the packages are flowing more slowly through the network.

Chart 9. Average Per Capita Spending on Entertainment Services in the United States, by Sector, 1996
(US\$ Per Annum)



Source: ITU, Challenges to the Network, 1997a.

the need for patients to move. The EU estimates that savings from electronic medicine could reach 5-10 per cent of health budgets (OECD, 1997h).

We mentioned before that online travel and entertainment services are perceived to have considerable growth prospects. Airlines and hotels see great potential in reducing costly travel agency fees via direct bookings through the Internet, with the resulting savings passed on to consumers in the form of lower travel and hotel charges. Forrester Research predicts that the online booking value for airline tickets will increase from about US\$ 500 million in 1997 to US\$ 8 billion by 2001 in the United States, and from US\$ 2 million to US\$ 1.5 billion in the United Kingdom.

The online purchase of entertainment services also receives considerable attention. Video games, gambling or music feature prominently. Gambling in "virtual" casinos, possibly worth several hundred million dollars, has caught the attention of competitors in "real" casinos and of regulators. So far, however, the online entertainment spending of US\$ 7 per year per Internet user is dwarfed by spending on home video, books and television (Chart 9).

Another sector which so far has received very little attention in this context is the delivery sector. If consumers and businesses increasingly order goods electronically which require physical delivery, this may expand opportunities for delivery services. This growth is likely to outweigh the potential decline in business from electronic delivery of certain goods. Efficient and inexpensive delivery services may be crucial to the full development of electronic commerce in this area.

Last but not least, the changing role of government as a provider of goods and services should briefly be discussed. Governments could probably realize considerable cost savings through electronic bidding and public procurement, service provision online, and electronic tax collection or customs clearance. These savings could be forwarded to consumers and taxpayers through lower taxes and fees. In addition, the transparency and accountability of the public sector could improve through better publication and access to government data, as well as more open public procurement.²⁰ Government objectives of cultural diversity, and rural and regional development

²⁰At the supra-national level, the International Monetary Fund, for example, has set data dissemination standards and publishes the sources for economic data of countries meeting these standards on the Internet. This is expected to increase the transparency of public policies and government accountability towards financial markets, and thereby, indirectly, policy credibility, as errors would be quickly penalized by financial markets.

Box 2: Electronic Commerce as a Means of Trade Facilitation

In recent years, there has been growing interest in the use of electronic means to facilitate the flow of international trade. Losses suffered by businesses from delays at borders, complicated and unnecessary documentation requirements, and lack of automation of government-mandated trade procedures sometimes exceed the costs of tariffs and other official charges. Efforts to simplify and harmonize international trade procedures, also called "trade facilitation", span a broad range of subjects: e.g., official procedures, transport, electronic data transmission, banking and payments, insurance, and business information. Electronic Data Interchange (EDI) and the Internet are instrumental for trade facilitation by providing the communication network between the involved traders, businesses, and government agencies.

For more than 30 years, numerous inter-governmental and non-governmental organizations (e.g., UNCTAD, the UN Economic Commission for Europe, the World Customs Organization or the International Chamber of Commerce) have been working towards the goal of more simple and harmonized international trade procedures. The first step towards trade facilitation was introduced a number of years ago, when the alignment of documents and forms according to the UN Layout Key made documentation requirements less burdensome. Work is currently underway in the Group of Seven and also in the Asia Pacific Economic Council to develop common data elements for the submission of trade documentation, based on UN/EDIFACT, which would be accepted by customs and other government agencies in all participating countries. Furthermore, the Kyoto Convention addresses the simplification and harmonization of customs procedures. It is expected to provide binding rules on internationally streamlined customs operations, making it obligatory that new national legislation allows traders to submit documents in electronic form to customs.

In the last decade, EDI between traders, customs and other government agencies has yielded considerable savings, as data can be exchanged without re-entry or manual data copying. This saves time and reduces the margin of errors considerably. Yet the potential for use between traders and government agencies has not yet been fully exploited. Through EDI (with gateways to the Internet), all government agencies could be provided in advance with all data necessary for clearance at the border, which could accelerate considerably the clearance of goods for border crossing. For traders with established track records, the crossing of borders could be de-linked entirely from submission of documents and certificates. Controls of every single transaction could then be replaced by spot-checks and regular audits. This procedure would allow government agencies to handle increased volumes of trade without slackening control.

Singapore is the first country where the entire trade transaction process was based on information technology and EDI-based information exchange. TradeNet, a value-added network linking the trading community (traders, freight forwarders, and cargo and shipping agents) to more than twenty government agencies involved in the import/export process, was launched in Singapore in 1989. Instead of submitting documents to and obtaining permits separately from each government agency, a single electronic document is routed through the network and returned with the necessary approvals within 15-30 minutes. This compares to 2-3 days before the introduction of TradeNet. Today, more than 98% of all trade declarations in Singapore are processed through this system, allowing companies to move cargo at short notice and reducing costs by as much as 50%.

Electronic submission of trade documentation has become the rule in a number of other countries as well: in the United States, Canada, and some member states of the European Union, more than 90% of customs declarations are submitted electronically. In the future, the Internet is likely to facilitate electronic customs clearance further, as new packages are developed to facilitate information flows.

Sources: For further information, contact UNCTAD, UN Economic Commission for Europe, World Customs Organization, Asia Pacific Economic Council, International Chamber of Commerce, the Group of Seven and the Kyoto Convention.

could be boosted through low cost and easy access to information on the Internet.

D. International trade and electronic commerce

Internet-based electronic commerce and electronic delivery of many products will facilitate international trade

A number of reasons suggest that electronic commerce, and in particular the Internet will boost international trade. The telephone and the fax already allowed much speedier communication between trading partners across borders. The Internet further facilitates trade by allowing even faster and cheaper communication.

Furthermore, a range of products can be transmitted electronically which, we mentioned above, saves time and shipping costs. International trade in goods and services which can be digitalized should therefore expect particularly strong growth. Computer related products, like software or customer services, can be provided online as easily across countries as within countries. International trade in entertainment services such as games, videos and music also has great potential. Financial institutions see much scope for providing financial services internationally through the Internet: 60 per cent of non-American banks intend to expand internationally through their Internet services. Surprisingly, however, this share is only 18 per cent for U.S. banks (Booz, Allen and Hamilton, 1997b).

Furthermore, electronic commerce and the Internet could boost international trade in a more indirect man-

ner, through facilitating trade and customs administration (see Box 2). In fact, the overhead costs for international trade are estimated at about US\$ 350 billion in 1996, or 7 per cent of the value of world trade. In some instances, 100 documents and 20 different organizations are involved in conducting international transactions. Savings from more efficient data processing could be as high as US\$ 100 billion (ITU, 1997a).

Even though there are no figures for electronic cross-border trade, it was noted above that 85 per cent of Internet revenue is generated in the United States while only 62 per cent of the users are located there. This suggests that the United States is probably a net exporter of products through the Internet. Some simple extrapolations might also be useful to put the future importance of electronic commerce into perspective. Currently the ratio of exports and imports over GDP for the United States is about 20 per cent. Much of the expected worldwide Internet transactions of maybe US\$ 300 billion by 2001 will fall on the United States. If we assume that the same ratio of international trade applies to the Internet as to overall economic activity in the United States, international trade via the Internet may reach US\$ 60 billion by 2001.

Where products cannot be delivered over the Internet, high shipping and administrative costs could make many international low-value transactions unprofitable

To the extent that products delivered physically following purchase over the Internet involve the shipment of small packages, the cost advantages of bulk shipment are lost. Costs such as insurance and shipping and customs administration can reach or even exceed the value of the product itself (see, for example, the case presented in Table 10). Unless shipping and administration become much easier and cheaper, cross-border transactions of this kind may experience limited growth. A number of suggestions have been made for reducing administrative costs. For example, the collection of taxes and

Table 10: Cost of Shipping within the United States and from the United States to Europe*

(In US \$)

	New York - Alaska	New York - Paris
Cost of shirt	100.00	100.00
Shipping, insurance	31.50	77.50
Sales tax	8.25	-
Customs duty, VAT	-	50.08
of which:		
on product		(33.00)
on shipping and insurance		(17.08)
Total	139.75	227.58

*Price for delivery from New York of a 3½ kg package worth \$100, 1996. Source: The Economist, November 1, 1997.

customs duties could be privatized, with audits securing adequate collection. Canada has taken a step in this direction by allowing recognized carriers to collect taxes and duties for small packages, with the carrier including these in the customer's bill. Obligations by carriers are then settled once per month with the government (The Economist, November 1, 1997). This system accommodates much faster and cheaper cross-border transactions, both for the Canadian government itself and for consumers. Other options include an extension of the tax and duty-free threshold for small transactions (OECD, 1997c). In addition, shipping and mailing costs could often be lowered through increased choice and more cost-effective transportation and distribution.

In summary, there is considerable evidence that electronic commerce, particularly via the Internet, will experience strong growth in the near future. Much of the success of the Internet as a medium of domestic and international trade, however, will depend on the resolution of a number of challenges in the technical and legal/regulatory sphere. These are discussed in the following sections.

V. Policy Challenges in Electronic Commerce

There can be little doubt that open markets are essential for the development of electronic commerce. A liberal regime encourages technical progress and the development of efficient practices. Market forces, however, may need to be complemented by industry self-regulation and/or government intervention to secure the following: (i) standards for the emerging global telecommunications infrastructure; (ii) adequate investment in the infrastructure; (iii) user-friendly and broad-based access; (iv) a predictable legal and regulatory environment which enforces contracts and property rights, (v) the security and privacy of data; (vi) rules for dealing with what constitutes unacceptable or conditionally acceptable content; (vii) a predictable framework of taxation and financial regulation; and (viii) equal opportunity through better education for users in industrialized and developing countries.

It should be noted that none of these issues are fundamentally new. Infrastructure, standards, and access have been important since the invention of the telephone. Legal and security issues, content regulation, tax issues, adequate financial regulation, and social concerns have been of concern to businesses and regulators in many areas. However, given rapid changes in the area of electronic commerce, care needs to be taken to ensure that regulation does not fall behind or unnecessarily interfere with new developments. In this context, it may be noted that much work is being done by the international business community to deal with many of these challenges, but in a number of areas governmental or inter-governmental action may be necessary. This study, however, does not seek to identify the appropriate apportionment of governmental and non-governmental responsibility in any of the areas concerned.

A. Access to the infrastructure

Building a global infrastructure with smooth information flows and affordable access to this infrastructure is facilitated by a competitive environment

All forms of electronic commerce, and in particular Internet commerce, are only possible through a telecommunications infrastructure which provides sufficient capacity for unobstructed information flows.²¹ Congestion on the Internet has become a problem. The solution to this problem is the expansion of infrastructure capacity through more fiber-optic cables and satellites or the use

of new networks, such as cable-TV or even electricity lines. But the lack of infrastructure is often a more general problem, even in terms of insufficient telephone connections, and many countries would be glad if their only problem in this area was occasional congestion on the Internet.

Another obstacle to electronic commerce can be inadequate pricing policies. Electronic communication and commerce is often discouraged by high telecommunication charges which do not necessarily reflect the costs or scarcity of infrastructure. In Europe, for example, the cost of phone connections or leased lines can be several times as high as in the United States (Beltz, 1997). On the other hand, excessively inexpensive or undifferentiated pricing can cause overuse and bottlenecks.

These observations render the debate over public versus private infrastructure provision and pricing particularly important. An economic literature has emerged on this subject, with the arguments tilting in favour of growing private sector involvement, complemented by government regulation.²² A basic principle derived from this debate is that infrastructure usage should be priced such that operating costs and investment expenditure can be recovered, thereby encouraging sufficient investment. Charges should also reflect the relative scarcity of infrastructure (for example, through higher charges during peak hours), to prevent bottlenecks and promote efficient information flows. However, pricing should not allow the abuse of monopoly positions. This could unnecessarily reduce Internet access and use, and impair the competitiveness of users.

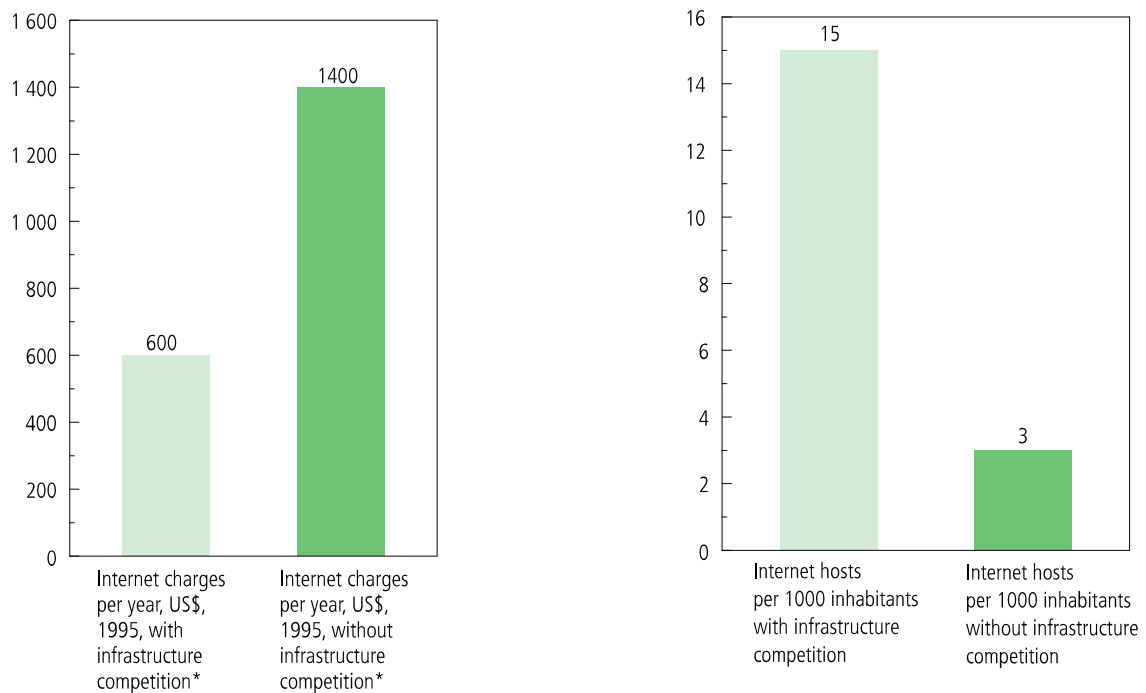
Internet users also need access to the network at home or at their workplace. For "small" users, this is typically obtained through Internet service providers while larger companies and organizations largely have direct access to the network. Again, access availability and pricing are important. Licensing of service providers seems to be used frequently to limit competition amongst providers of infrastructure access, keeping prices high and access limited.

Infrastructure and access costs have been found to be an important determinant of Internet use. Chart 10 illustrates the difference in Internet charges in OECD countries with and without infrastructure competition. Countries where infrastructure competition is absent show, on average, more than twice the costs and only one fifth of the Internet usage of those with infrastructure competition. In some developing countries, high

²¹See Section III for a more detailed discussion of the underlying issues.

²²Technical progress also undermines the sustainability of national monopolies and restrictions to competition in the telecom sector. In the presence of Internet telephony, for example, national voice telephone service monopolies will find it difficult to maintain their business (OECD, 1996a).

Chart 10. Internet Charges and Host Density, With and Without Infrastructure Competition, 1995



* Purchasing power parity-based calculation, includes 20 hours online per month and charges for "Dial up" access through an Internet Service Provider.

Source: OECD, Internet Access Pricing, OECD/EC/COMTEC Workshop, Dublin, June 20, 1996c.

prices and insufficient infrastructure not only impair access, but also largely limit Internet use to e-mail, as other Internet functions are too expensive and time-consuming.

In summary, competition among infrastructure and service providers, and appropriate pricing and licensing practices may help to strengthen infrastructure and access services. With growing awareness of the necessity to change, many countries have either moved or are moving in this direction (OECD, 1997g). This includes both domestic liberalization of telecommunications and information technology markets, as well as increasing commitment to trade liberalization in these sectors. It is against this background that the GATS negotiations on basic telecommunications, completed in February 1997, and negotiations on an Information Technology Agreement were able to generate significant results (see Section VI:A below).

Frameworks and standards should promote "universal communication"

The Internet allows, in principle, an unlimited number of users, who are part of numerous networks, to com-

municate with each other within and across networks without passing through centralized authorities.²³ The smooth, universal flow of information through the Internet, however, should not be taken for granted; it is only possible because users (often without knowing it) apply a basic set of common standards. A smooth information flow between all Internet users, for example, requires that networks are "interconnected". This means that networks must be connected with each other and permit non-discriminatory access to data flows from other networks. Only then can information be "routed" and "switched" in a speedy and reliable manner through and across networks. The other important prerequisite for successful communication on the Internet is "interoperability". The latter refers to the ability of all Internet users to communicate, independent of the computer, Internet service provider, or network used. For example, both sender and recipient must use the same standard for coding and decoding their messages. The OECD recommends that frameworks and standards which secure interconnectedness and interoperability be promoted by governments and the private sector in order to protect the potential for "universal" communication across networks (OECD, 1997g). This is being accomplished by

²³For a detailed survey of these and the following rather technical issues see, e.g., Abrams and Doernberg (1997), or OECD (1997g).

means of communications protocols, or sets of rules governing how computers exchange information with each other. These Internet protocols have been made freely available to everybody, and have thus become open standards.

Appropriate "address" policies and affordable, user-friendly hard- and software make the Internet and electronic commerce more attractive

Address policies are also very important for Internet commerce. Every Internet host can acquire a "domain name". For example, "wto.org" is used for the World Trade Organization. For companies, the domain name is typically closely linked with their trademark. A company with a popular brandname, for example, is likely to attract much more attention if its Internet address corresponds to its brandname. Attempts by some people to acquire certain domain names (typically of famous brands) and to sell the user rights to the brandname owners, illustrates the importance of this issue.

Apart from the hardware required, which usually includes a computer and a modem, Internet users also need an Internet browser, which is the software enabling the receipt and dispatch of information through the Internet. The lack of user-friendly software, however, is often deplored. It can be difficult for individuals with low computer skills to "surf the net". In this area, competition between private agents is likely to result in more affordable and user-friendly hard- and software.

B. The legal and regulatory framework for Internet transactions

A predictable framework with clear rules on jurisdiction and electronic contracts, and secure property rights, builds trust and boosts confidence in the Internet

Another key issue regarding electronic commerce and Internet transactions is the need for legal clarity and for adequate redress mechanisms. Legal uncertainty can arise within a country if electronic contracts are unclear in terms of their enforcement or redress potential. The extrapolation of existing contract law to the electronic sphere may minimize such uncertainties. However, this situation can become more complicated in the case of international transactions, where uncertainty about the jurisdiction of Internet commerce is seen as one of the main obstacles to international trade. Recall the example of the Internet-based diagnosis of an X-ray by a specialist abroad, where an X-ray was taken in country A,

the Internet-address was in country B, the specialist in C, and the business establishment of the Internet address owner was in country D. Assume that a problem occurred in the diagnosis or the transmission of the findings. The hospital requesting the service may face difficulties in determining which contract law and which rules regarding liability apply. Independently of whether the traded product is only a small gadget, a large machine or a medical service, uncertainties over the contractual terms and redress may inhibit the development of electronic commerce across borders.

Various suggestions have been made regarding the question of which country's law should apply to electronic commerce. Some commentators have suggested that the commercial law of the seller's country should apply (Lascelles, 1997).²⁴ Others have argued that the commercial law of the buyer's country should be applicable. Without international conventions or rules on this jurisdictional question, parties are free to respond to this uncertainty by agreeing on their own contractual terms, including the place of jurisdiction. However, such ad hoc arrangements will only benefit reasonably large purchases, which make the transaction costs involved worthwhile.

Other problems relate to the acceptability of electronic signatures and electronic documentation for enforcing contracts and providing evidence in case of a dispute. Questions about the validity of electronic "evidence" can also become relevant when companies want to fulfil their tax or audit requirements. Some countries, for example, only accept signatures by pen on paper as legally binding for certain transactions. This is the case, for example, with real estate transactions in Germany. Companies have often responded by establishing a parallel "paper trail" (e.g., through the mail) when using other means of electronic commerce in the past.

In light of these uncertainties, some observers have proposed a uniform international commercial code, or a "model law" for international electronic commerce (OECD, 1997c). This should recognize, facilitate and enforce international electronic commerce, and thereby strengthen the predictability of the legal environment. Initial work in this regard is being conducted by the UN Commission on International Trade Law (UNCITRAL, 1997; OECD, 1997c). Self-regulation, laying down codes of conduct or "model contracts", is also frequently cited as a useful avenue, as companies are interested in building confidence and weeding out the "black sheep" (The Economist, November 1, 1997). Regardless of the particular solution adopted, clarity of the rules of electronic commerce and improved redress systems are key to future growth in this area (OECD, 1996b).

²⁴Treating Internet sales as consumption abroad would disadvantage sellers from countries where legal security is perceived as insufficient because customers would not want to buy from such sites.

Additional problems have been cited in the context of enforcing intellectual property rights for products sold over the Internet (see section VI.F). Copyright protection is important to maintain the availability of high-quality goods and services on the Internet: if revenue from copyrights cannot be collected from Internet commerce, such commerce is likely to cease altogether. A number of technical solutions are being developed to track products with copyright contents. "Digital object identifiers" consisting of a string of numbers attached to a copyrighted text, for example, could help track the illegal provision and dissemination of material. Other possibilities include codes which prevent the printing and forwarding of copyrighted information.

Internet content regulation will pose challenges, and solutions should not unnecessarily impede communication and commerce

Finally, Internet users and regulators are frequently concerned about Internet communication and commerce involving the distribution of "illegal" or "harmful" content. Conflicts of interest between advocates of the "freedom of speech" and those who want to protect security, human dignity and morality are bound to arise over certain types of Internet information. There would be little disagreement that certain types of content are simply unacceptable, such as bomb-making instructions or the distribution of child pornography. But other types of content are more controversial and complex to address (see Chapter IV.G)

Independently of any consideration of what governments seek to regulate, implementation will pose technical and other challenges. Understanding the technology and technological potential to see where and how content can best be controlled is of crucial importance (OECD, 1997a). Moreover, self-regulation, software-based classification systems and technical means of trailing and filtering information are being explored in response to these challenges. This is important not only for governments but also, for example, for parents who would like to preselect the information to which their children have access. Even if violent movies are allowed in a country, parents may prefer their children not to see them. "Filters", for example, are being developed, which allow parents to prevent their children's access to material considered detrimental. "Blacklisting" or "whitelisting" of websites and software, and identification through domain names can facilitate the filtering of information. Producer "codes of conduct" and voluntary labelling for rating and filtering purposes are also being discussed (OECD, 1997a). It is, nevertheless, important to ensure that efforts to implement content regulation do not suffocate electronic commerce.

C. Security and privacy of transactions

Security and privacy of data flows must be protected

Surveys of Internet users reveal that future growth of electronic commerce via the Internet will also depend on the security and privacy of transactions. Only if buyers and sellers trust that orders and payments are conducted with minimal risk of deceit and abuse of any information provided will they accept the Internet for electronic commerce purposes. If users fear that their orders may be changed on the way, their credit card numbers stolen, or private information mis-directed, they will revert to more traditional instruments of electronic and non-electronic commerce. Similarly, buyers and sellers will only take the risk of making contractual obligations over the Internet if they know their rights and obligations and that these will be enforced. In fact, security concerns of phone and fax transmissions have often limited their commercial use in the past.

Key issues regarding the safety of transactions are: (i) the identification of the sender and recipient of a message (that he/she really is the sender/recipient and not somebody else); (ii) the authentication of the message (that the message has not been changed in transit); (iii) non-repudiation (that a buyer cannot falsely claim that payment has been made and a seller that payment has not been received); and (iv) encryption of the payment information (the scrambling of messages, such as credit card numbers, so that they cannot be read by unauthorized persons). Technical progress has provided potential solutions in all these areas. "Digital signatures" and a "message digest", for example, can verify that a message has not been altered. A "digital certificate" can confirm the identity of the person who sends and digitally signs a message (OECD, 1997b). "Double-blinded encryption" also allows for payment of an "online" order without the seller seeing the credit card number. International transactions require that digital signatures and certification are internationally interoperable and recognized, and adequate encryption techniques are available in all countries.

A first "online" payment system which secures safe payments and data confidentiality has been developed by a number of companies. The so-called SET (Secure Electronic Transaction) standard has been in a trial stage since June 1997 (see Box 3). Various government initiatives, including the EU Data Protection Directive in force from 1998, and the non-binding OECD guidelines for cryptography policy have been launched in order to strengthen the security and privacy of data transmission. UNCITRAL (1997) has suggested that various reliable methods for electronic signatures be recognized.

Box 3: Towards Secure Electronic Transactions: The SET Standard

Security of data flows is a critical element in building trust in the Internet as a medium of exchange. In this regard, a number of technical difficulties involved in preventing the interception of messages and credit card numbers, or the use of false addresses and identifications have limited the use of credit cards for "online" transactions in the past.

To tackle this problem, two of the principal credit card issuers, in collaboration with a number of firms from the information technology and telecommunications sectors, have developed a standard for Secure Electronic Transactions (SET), which was released on June 1 1997. SET improves the security of an Internet purchase by credit card, and the related payment authorization and money transfer. Message encryption, digital signatures and cryptographic certificates keep credit card numbers and transaction details private when sent across a network. A key role in this process is assigned to a third party (a bank or financial institution) which holds and issues the "keys" that the involved parties need to decrypt each other's SET messages. This procedure prevents payments from being altered and confirms the identity of the seller and the validity of the buyer's card. Further improvements in the SET standard are already being prepared, including its use in combination with smartcards.

Internet security itself is perceived as a strong growth market, as users become increasingly aware of the importance of data protection, and SET is only one element of the broader security challenge. The worldwide market for Internet security products - authentication and encryption, firewalls (which separates parts of networks for security purposes), anti-virus tools and services - is expected to increase from about \$900 million in 1996 to \$7 billion in 2001.

Sources: Financial Times; "New Standard Opens the Door to Electronic Commerce"; George Black; 2-7-1997; Financial Times; "US may spend \$1 billion to fend off"; 23-10-1997; Financial Times; "ICC to unveil rules for Internet trade", 6-11-1997.

Principles for data privacy suggested by the OECD include the requirement that personal information will not be collected or used without the person's knowledge, and will not be made available to others (OECD, 1997c). The International Chamber of Commerce promotes security of Internet transactions through a self-regulatory framework for businesses over open networks, called GUIDEC (General Usage in International Digitally Ensured Commerce). The security of electronic commerce worldwide is also dependant on the availability of encryption techniques (OECD, 1997g).

D. Issues in taxation

The taxation of electronic commerce should be administratively straightforward and non-distortionary

Electronic commerce, in particular the Internet, could have important implications for taxation.²⁵ If Internet transactions are not taxed, this would give the medium a considerable advantage over other means of commerce that are taxed. If a value-added tax (VAT) of 20 percent, or corporate income tax of 30-50 percent, could be circumvented via the Internet, the latter would be made more attractive for sellers and buyers alike. This,

however, is not in the interest of the general public. In principle, taxation of any electronic or non-electronic commerce should be easy to administer and should not introduce unnecessary distortions and discrimination. The OECD has developed a number of basic rules for the taxation of electronic commerce (see Box 4).

The collection of VAT and corporate income taxes for Internet-based transactions will pose considerable challenges

Regarding tax administration, it was noted earlier that Internet and EDI can facilitate the administration of income tax, sales tax and customs. Electronic tax filing and data processing makes tax administration cheaper. Enforcement and control can benefit from cross-checking of information between tax departments and between countries. On the other hand, tax administration will also become more challenging, as taxable "online" transactions will become more difficult to trace, especially if payment records are encrypted.

One particular challenge in this context relates to the collection of VAT or sales tax across borders.²⁶ In principle, VAT should be collected by the authorities of a country where a product is consumed. Instead of taxing the consumer, however, governments have been taxing the

²⁵The question of customs duties in the context of international electronic transactions is discussed in Section VI.B. The treatment of tax issues in this study is by no means exhaustive.

²⁶In the United States, domestic sales tax collection is challenged by Internet trade as well. Interstate mail order sales are exempt from general sales tax, with an estimated sales tax revenue loss of several billion dollars per year. If Internet commerce is treated in a similar fashion, the expected rapid expansion of trade could result in considerable additional revenue losses and economic distortions.

Box 4: Seven Criteria to Judge Proposals to Tax the Internet

A number of OECD studies provide a detailed discussion of many tax-related issues regarding electronic commerce. The following considerations should be understood as guideposts for an efficient and equitable taxation of the Internet, but they do not recommend a particular policy approach.

1. *The system should be equitable:* tax-payers in similar situations which carry out similar transaction should be taxed in the same way.
2. *The system should be simple:* administrative costs for the tax authorities and compliance costs for taxpayers should be minimised as far as possible.
3. *The rules should provide certainty* for the taxpayer so that the tax consequences of a transaction are known in advance: taxpayers should know what is to be taxed and when - and where the tax is to be accounted for.
4. *Any system adopted should be effective:* it should produce the right amount of tax at the right time and minimise the potential for tax evasion and avoidance
5. *Economic distortions should be avoided:* corporate decision-makers should be motivated by commercial rather than tax considerations.
6. *The system should be sufficiently flexible and dynamic* to ensure that the tax rules keep pace with technological and commercial developments.
7. Any tax arrangements adopted domestically and any changes to existing international taxation principles should be structured to *ensure a fair sharing of the Internet tax base between countries*, particularly important as regards division of the tax base between developed and developing countries

Source: OECD Observer No. 208, 1997k.

final seller under the assumption that consumption takes place in close proximity. This saves considerable administration costs. Internet-based commerce could make VAT collection much more costly for inter-jurisdictional transactions. Regarding goods which are physically sent across the border after an electronic purchase, the administrative costs for taxing the small packages in which they may be sent would rise, compared to previous bulk shipments across border. Each package would have to be assessed individually, and consumers could add to this burden through time-consuming inquiries and lack of experience with procedures. Privatization of tax collection and raising tax-thresholds were mentioned in the previous section as possible solutions. Taxation of services, however, is much more problematic and even raises some systemic issues. The OECD has found that services trade between selected countries leads to no taxation in some cases and to double-taxation in others (OECD, 1997l, and OECD, 1998).

It has been suggested that in order to improve VAT administration, the place of supply (and therefore of taxation) might be better defined as the place where the customer is established (OECD, 1997l). Concretely, this could mean that a United States company selling over the Internet in several European Union countries would have to register for VAT purposes in all these European Union countries for its Internet-related sales. Alternatively, companies could have fiscal agents in countries they are selling to. Companies buying over the Internet abroad could be required to conduct self-assessment for VAT purposes. While the need to tackle this fiscal challenge is understandable, it should be noted

that such a requirement could raise the administrative costs of cross-border trade considerably, especially for small suppliers. As a result, small sellers might refuse to do business in some countries, and small countries might find themselves excluded from much Internet activity. Moreover, a supplier using the Internet as a medium cannot predict all the geographical sources from which business might be forthcoming. Another way of collecting VAT might be through the financial side of each transaction. Banks and/or credit card companies, for example, could be charged with the responsibility for collecting taxes through debiting customer accounts and transferring revenue periodically to the tax authorities. The feasibility of such an approach would need to be assessed in light of various technical and legal problems that would doubtless arise.

The Internet also poses a challenge for corporate income tax administration and policies. Corporate taxation typically requires a "physical presence" or a "business establishment" in a country. This definition may become meaningless in the context of electronic commerce, where no physical presence is necessary at all. Assume, for example, that an Irish consumer contacts an Irish Internet address to download software. The Internet address may simply be a computer requesting the software from, say, the United States. The company owning the address and selling the software could be located in a tax haven. Who should then be able to collect corporate income tax? Is an Internet address sufficient to constitute a business establishment? Is there a business establishment in the United States, as the software is "stored" in the country, or should corporate income tax

Box 5: Four Key Considerations on Electronic Money

The Bank of International Settlement's Working Party on electronic money has discussed consumer, law enforcement, and supervisory issues which consumers, providers, and authorities may wish to give attention in the implementation and use of electronic money products as well as in the development of national policies. The formulation of these considerations is meant to highlight potentially important aspects without implying any particular policy approach:

Transparency: Potential users can best make informed choices about the relative merits of electronic money products if their features, costs, and risks are sufficiently transparent. Useful disclosures for consumers could include information about significant user rights, relevant information on the issuer and its obligations towards consumers, applicability of any deposit insurance or other guarantees, and intentions regarding any use of personal data.

Financial integrity: The financial integrity of any electronic money issuer rests importantly on adequate liquidity, capital, and internal controls. Liquidity should be adequate to ensure that issuers can meet demands for funds; investment policies should be appropriate to ensure the solvency of the electronic money scheme; management should establish risk management policies and procedures and internal controls consistent with protecting the financial integrity of the scheme.

Technical security: Technical security measures have important implications for the financial and operational reliability of an electronic money scheme. These measures should be assessed comprehensively with the aim of protecting against fraud or counterfeiting attacks that could threaten the overall integrity of the electronic money scheme.

Vulnerability to criminal activity: The design of electronic money schemes can affect importantly the risks of criminal usage of and attacks on electronic money. As a result, realistic evaluation should be conducted of the vulnerabilities of particular products to these risks.

Source: Bank of International Settlements (BIS) (1997) *Electronic Money: Consumer Protection, Law Enforcement, Supervisory and Cross Border Issues*, Basle.

be collected in the place of official business registration, which, in this case, is the tax haven? Countries may have to rethink how business establishment should be defined for Internet-based commerce (OECD Observer, 1997k).²⁷

The bit-tax may be an inappropriate instrument for taxing electronic commerce

Given these challenges in the fiscal area, some economists have suggested taxing the data stream flowing over the Internet rather than the transaction itself (Soete and Kamp, 1997). In theory, a "bit tax" could eliminate the advantages of traders trying to avoid income and consumption tax. However, a number of shortcomings of this proposal suggest that a bit tax may not be an appropriate instrument for taxing electronic commerce (OECD, 1997d). First, the volume of data flow is difficult to measure accurately. Second, there is a problem with ascribing value to the data and to determining what is taxable and what is not. The taxation of all data exchange would not distinguish between high and low-value products. It would even mean taxing data such as e-mail and information which is not part of a commercial transaction. To tax browsing and reading on the Internet would be like imposing a tax on reading a magazine or watching television. In short, a bit-tax would be a blunt instrument, blind to any subtlety in public policy considerations.

E. Electronic money

Electronic money creation can, so far, be handled with established legal and regulatory instruments

In recent years, electronic money (or units or tokens of monetary value that take a digital form and are transmitted over electronic networks) has emerged as a means of payment "online". This has raised some concerns regarding consumer protection, law enforcement, supervision and regulation of the issuers of electronic money, and the effect on monetary policy. Given the importance of a stable financial system and adequate monetary policies for macroeconomic stability, the Bank of International Settlements (BIS) has undertaken a detailed initial assessment of these issues, on which the following discussion is largely based (BIS, 1997).²⁸ The BIS provides "several key considerations which consumers, providers and authorities may wish to give attention in the implementation and use of electronic money products and in the development of national policies" (see Box 5). It should be noted, however, that expectations regarding the growing importance of electronic money have so far largely failed to materialize. People were found to dislike paying for very small, metered transactions for which electronic money was originally conceived. Furthermore, the minimum amounts for payment

²⁷Other challenges in the sphere of taxation are the prevention of transfer pricing and the (mis-)categorization of electronic commerce revenue as sales income, rental income, royalties or income from services (Abrams and Doernberg, 1997).

²⁸The importance of adequate regulation and supervision of financial institutions, and sound monetary policies is discussed in detail by Kono, Low, Luanga, Mattoo, Oshikawa and Schuknecht (1997). Dahl and Lesnick (1996) discuss the requirements of a well-functioning electronic payment system.

by credit cards (the most prominent alternative to electronic money) are continuing to decline.

On the other hand, security concerns over online credit card payments are presently being tackled. Consumer protection from fraud, loss or insolvency of an institution issuing electronic money does not raise many questions different from those arising in the context of existing means of payment, and governments can address these problems through existing laws and regulations. Regarding law enforcement, the current predominant use of electronic money for low-value transactions does not yet raise particular concerns about money laundering, tax evasion or other financial crime. However, if large amounts can be transferred in the form of electronic money, and if electronic records and tracing capacities remain poor, cross border electronic money transfers to countries with weak anti-money laundering laws can become an attractive option for criminals. As electronic money evolves, the potential for crime needs to be monitored, and further laws and regulations may need to be considered over time.

A third important issue refers to the effect of electronic money issuance on the regulation and supervision of financial institutions. If existing credit institutions issue electronic money, the current regulatory framework is probably sufficient to secure adequate precautions against liquidity and operational risks, and to maintain adequate internal controls. Other issuers of electronic money may require a regulatory framework specifically tailored to them, but as long as only small amounts of money are involved, a more lenient supervisory regime might be appropriate. Cross-border payments, in particular, could give rise to fears that issuers incorporate or establish facilities in countries with the least stringent regulatory requirements. Despite these concerns, cross-border payments should not be impaired unnecessarily by overly restrictive national policies.

Finally, the issuance of electronic money could potentially affect the seigniorage revenue and monetary policy formulation of central banks. Electronic money is likely to replace cash and thereby reduce central banks' seigniorage revenue. Only if electronic money replaces a large share of cash, however, is declining seigniorage going to affect the financing of central bank operations (and the transfer of the residual to the government budget). Monetary policy formulation could be affected through effects on money demand and supply, and the velocity of money. However, since no major replacement of cash and deposits by electronic means is expected in the near future, the impact should be minor.²⁹

F. Enhanced opportunity in developing and industrialized countries

Affordable access to the medium will spread the benefits of knowledge more widely and create new opportunities in both developing and industrialized countries

The growth of electronic commerce and Internet use will have significant distributional implications and effects on opportunity in society. There could be a growing divide between those with the necessary access and skills to profit from the new opportunities, and those who lack such prerequisites. The latter group is likely to comprise, in particular, the poor and elderly.

Studies for the United States have shown that Internet use is concentrated on educated males between the age of 15 and 50 with above-average income. Although the share of women and low-income users has increased, and a growing number of older people using the Internet has been recorded, private initiatives and policy measures may be required to improve access and skills amongst disadvantaged groups.

Declining costs through technical progress and increasing competition have already made electronic communication and commerce much more affordable and accessible, and further price reductions can be expected. This will benefit in particular the less well-off. Government policies supporting competition and the private provision of low cost equipment and services may do more for the poor than, for example, government subsidies. Nevertheless, some support for infrastructure provision and access in remote areas or to poor people by government or private initiatives could also be helpful. Privately sponsored computer centres or donations of equipment have assisted the poor in gaining computer access in a number of countries.

Government and the private sector could also help to exploit other socially beneficial synergies from the expansion of electronic commerce, for example, to strengthen cross-cultural communication and mutual understanding between countries. A recent initiative has proposed intensified exchange and interaction between artists and industrialists in telecommunication and information technology (see Box 6).

Another important element of equal opportunity in the information age is training. Internet use requires considerable computer skills. Schools in industrial countries today frequently provide computer training on a routine basis. But as familiarity with computers becomes more commonplace among the young, this accentuates the disadvantages faced by computer illiterates. Adult education is required to address this problem. Computers

²⁹For a more detailed discussion, see BIS (1997) and Choi, Stahl and Winston (1997).

Box 6: Art and the Internet

A number of artists and telecommunication executives met in France in July 1997 to discuss interdependence between art and telecommunication. Both groups seek open communication without geographical boundaries, promoting cultural diversity as well as national identities. Both also follow a code of conduct: art is restrained by self-imposed rules of ethics, moral and cultural values; telecommunication is bound by legal rules and customs, which determine what is acceptable.

Art and telecommunications are complementary, in that they offer different means of expression to society. Cultural and artistic innovations have also been a source of innovation in the technical area. Scriabine invented the concept of multi-media with his synaesthetic light and music concerts in the 1900s. Laszlo Moholy-Nagy, a founder of Bauhaus, did the first painting over phone lines in 1922. The musician Robert Boog invented the synthesizer in 1964 and Nam June Paik, a Korean artist, the first video synthesizer in 1967. The French artist, Piotr Kowalski, developed an online direct translation system between French and English in 1996.

Given these synergies between art and telecommunication, the conference derived a number of recommendations, elaborated in the "Souillac Charter", to strengthen mutually beneficial exchange. As industry needs a "constant source of original and innovative ideas", it should support the exchange with artists. Education and training is taking place in art schools, and industrial support would be useful. In particular, an exchange program with "artists in residence" (a kind of internship) in companies and "producers in residence" in art schools should be built up. An online dialogue between artists, industry and government should provide for open exchange between these groups. Government should provide financial support to sponsor artistic research and development. When building a global communication system, cooperation between artists, industry and government can help to strengthen the "cultural and intellectual depth and the diversity of societies" through an "interaction of cultures" rather than a mere "exchange of bits".

Source: Barton, J. and Foresta, D; "The Souillac Charter for Art and Industry"; France, July 1997.

and the Internet will probably never be as easy to use as the telephone or a TV, but better education (and user-friendly technology) can provide almost everybody with the know-how to benefit from the new opportunities.

Developing countries have a lot to gain from electronic commerce and the Internet but fundamental challenges relating to access and education must be addressed

Electronic commerce and the Internet offer developing countries considerable opportunities to enhance economic growth and welfare. A number of countries already benefit from new export opportunities including data entry, software development, claims and forms processing and accounting. These opportunities, in turn, at-

tract more foreign and domestic investments, and thereby enhance growth (Primo Braga, 1997). In addition, developing countries are likely to benefit considerably from enhanced communication and information availability. Education and medical services come to mind, and several countries are improving their access to such information (Box 7). The Internet will make it easier for producers in poor countries to become part of an international bidding and supply process from which they were largely excluded in the past. The UNCTAD is supporting developing country efforts in this regard through its Trade Point Programme. The programme is creating a "Global Trade Point Network" to facilitate access to trade-related information for small and medium-sized companies and to promote the integration of developing countries into the world trading system. Trade Points

Box 7: The Internet and Medical Services in Bangladesh

Exchange of information and up-to-date knowledge on medical research and developments are of critical importance for effective health systems. A number of developing countries have begun taking advantage of the new opportunities to gain better access to medical information, by eliminating barriers to Internet use and by promoting cooperation between developing and industrialized countries. Bangladesh provides an interesting case study in this regard. Until recently, only three of the government universities had Internet access; most government medical schools had only one computer or none at all, and no Internet access was available. The main medical school of the country, Dhaka Medical School, had hardly any subscriptions to medical journals. This resulted in an acute scarcity of information and absence from international information exchange networks in the field of health and medicine.

In response to these challenges, MEDINET was established in Bangladesh. This network of online medical information is to provide Internet access to professionals and institutions on a non-profit basis. MEDINET is linked to two digital phone lines, which connects with the Internet every hour. The stored information, updated on a regular basis, is distributed among 60 individual users, 17 organizational users, and 6 distribution centres. E-mail accounts and local discussion groups are also planned. Registration is free, while monthly fees are relatively low, at US\$ 2.50.

Sources: Abul Kalam, A.; "MEDINET: A Nonprofit Initiative to provide Internet Access for Medical Professionals in Bangladesh"; Dhaka Medical College, Bangladesh; 1997.

are being connected with each other through the Internet (UNTPDC, 1998).

The example presented in Box 7 illustrates some of the basic problems prevailing in many developing countries (and to a lesser extent in many transition economies). These problems have so far restricted the benefits from electronic commerce and the Internet to a small minority. In many developing countries, incomes are so low that most people do not even have access to telephones. The Internet is out of reach, except for the very wealthy (ITU, 1997a). Other problems include an under-developed and outdated infrastructure, high prices and low service quality, lack of qualified personnel, and lack of literacy.

In response to these challenges, governments, the private sector, and international agencies and non-governmental organizations (NGOs) have introduced initiatives aiming at a better integration of developing countries

into the "global information infrastructure" (see Box 8 for more detail). In principle, new technologies such as low-orbit satellites, private sector funding and provision of services, and reforms of the regulatory environment (dismantling of monopolies, entry barriers, and price controls) should allow developing countries to progress rapidly (Primo Braga, 1997). Indeed, many developing countries are liberalizing infrastructure provision and access, as well as the information technology sector. In some Latin American countries, NGOs help people to become computer-literate and sell their products via the Internet. In Indonesia, so-called community clusters have emerged to allow access to telecommunication in rural areas. Partnerships between universities from industrialized and developing countries are assisting the latter in gaining access to global information networks. While these initiatives are not likely to produce significant results overnight, with time they will provide a strong impetus for growth and development.

Box 8: The Internet in Developing Countries

Through its global reach, the Internet provides an important opportunity for developing countries to obtain hitherto inaccessible and unaffordable information. The resulting knowledge transfer could stimulate growth of developing countries and help integration into world markets. However, many developing countries suffer from inadequate infrastructure and information technology. Government policies rendering access and equipment artificially expensive through monopolies and tariffs or other regulatory barriers can reinforce these problems.

As a result, telecommunication infrastructure is often outdated, telephone and computer access is limited, prices are high and service quality poor. Qualified personnel are rare, computer literacy is the exception, and cultural and language barriers further impede communication. In some developing countries, telecommunication charges are 20 times higher than in the United States. Registration and online service charges for 20 hours per month online can be as high as annual per capita GDP. Waiting periods for telephone lines can reach several years. Even if connected to the Internet, users often only take advantage of e-mail as other applications are slow and unreliable, and thus become expensive.

Building infrastructure and promoting access in developing countries may require a radical break with practices of the past, and a number of countries are taking on this challenge.

South-East Asia and East Asia are expected to experience rapid growth in the use of the Internet in the coming years, as determined government policies, private sector initiatives and liberalization provide for good infrastructure and access opportunities. Hong Kong, China features the highest growth rate for Internet hosts while five percent of the population in Singapore already have access to the Internet. Korea, Malaysia, the Philippines and Chinese Taipei are also expected to experience rapid growth in terms of Internet access. Considerable growth of Internet users is also expected in India: from 40,000 in 1997 to 2 million by 2000. In China, the number of Internet subscribers is projected to increase ten-fold from 300,000 users today to 3 million by 2000.

In a number of African countries, the private sector is playing a strong role in Internet development. Growth has been fastest in countries with open markets and a relatively liberal telecommunications sector, such as in Ghana, Ivory Coast and Uganda. Ghana features an infrastructure which has improved over the years, and may become the West African exchange and international hub for Nigeria, Togo, and Liberia. In addition, three Ghanaian regions are currently being connected by satellite to the international network. Downstream providers have been licensed to encourage Internet growth through cheaper access rates.

In Latin America, as in many other regions, network-based communication has been hampered by a lack of infrastructure. But liberalization and privatization are creating improved infrastructure and enhanced access. The Chilean experience demonstrates how a favourable domestic regulatory environment and the progressive liberalization of the telecommunication and information technology sectors have benefitted the country's access to international communication networks. Education policies have taken into account the changing environment of the information age: all secondary schools and half of the country's primary schools are connected to e-mail, so that children become accustomed to computers and the Internet.

Sources: NUA Internet Surveys, November 1997; www.techserver.com; International Trade Centre, UNCTAD, WTO; International Trade Forum; February 1997; "Developing a Viable Framework for Commercial Internet Operations in the Asia-Pacific Region: The Philippine Experience"; Philippines, 1997; Quaynor, N.; "Expansion of the Internet Backbone in Ghana"; Ghana, 1997.

VI. Electronic Commerce and the WTO

This section explores the various ways in which the agreements and activities of the World Trade Organization (WTO) may have a bearing on electronic commerce. As with the rest of this study, the approach is strictly non-prescriptive. The aim is to set out in a systematic fashion the main issues that seem relevant to the interface between electronic commerce and the WTO. What, if anything, governments ought to do in relation to the regulatory environment, or the policy framework more generally for the conduct of electronic commerce, is not a matter upon which the study pronounces. It is also important to note that this section makes no attempt to cover exhaustively all aspects of government intervention and regulation that might impinge on electronic commerce. Therefore, a range of issues which have been taken up briefly in the previous section are not addressed, including communication standards, security, privacy, financial regulation, and the promotion of equal opportunity among actual and potential users of the Internet for electronic commerce.

The discussion of WTO-related issues is divided into seven parts. The first part examines questions relating to the infrastructure required for electronic commerce. It focuses on the outcome of recent negotiations aimed at

liberalizing trade in information technology products and basic telecommunication services, and also considers the coverage of Internet access services in Members' commitments under the GATS. The second part deals with market access issues regarding electronically transmitted products,³⁰ including the implications of the recent United States and European Union agreement on duties affecting transactions on the Internet, the recent U.S. proposal to the WTO General Council on the customs treatment of electronic transmissions, and questions regarding the categorization of electronic transactions in the WTO framework. The third part looks at what has been achieved by way of trade liberalization commitments under the General Agreement on Trade in Services (GATS) in areas seemingly of most significance for electronic commerce (see Box 9 on the role of GATS).

Part four discusses the role of the WTO in trade facilitation with emphasis on the ways that the Internet and Electronic Data Interchange can simplify trade and customs administration. The fifth part looks at the way in which electronic commerce could transform the traditional approach to government purchases through the use of electronic technologies. The sixth part deals with trade-related aspects of intellectual property rights and

Box 9: The General Agreement on Trade in Services (GATS)

The General Agreement on Trade in Services (GATS), negotiated in the Uruguay Round, is the first multilateral trade agreement on services. The GATS covers all services except services supplied in the exercise of governmental authority. The sectoral classification generally used to schedule commitments under the GATS (document MTN.GNS/W/120) contains 11 main services sectors and one residual "other" category. These are business, communication, construction, distribution, educational, environmental, financial, health-related and social, tourism and travel-related, recreational cultural and sporting, and transport services. These sectors are further divided into sub-sectors and, in some cases, sub-sub-sectors. The Members of the WTO are in the process of considering how new services should be defined and treated under the GATS.

Trade in services is defined in terms of four modes of supply: (1) Cross-border supply, whereby, for example, domestic consumers purchase telecommunications services from a supplier in another country; (2) Consumption abroad, whereby consumers consume services abroad, sometimes by physically moving to the location of the suppliers, as in the case of tourism services, or by sending their property abroad, as in the case of ship repair services; (3) Commercial presence, whereby, for example, a foreign bank or transport company establishes a branch or subsidiary in the territory of a country and supplies services; and (4) Movement of natural persons, whereby, for instance, natural persons supply consultancy or construction service in the territory of a foreign Member country.

The GATS aims at negotiating a legally binding set of commitments to enhance predictability and provide transparency under the principle of progressive liberalization. The GATS framework consists of: (i) rules and obligations laid down in the GATS; (ii) annexes on specific sectors and subjects including an annex on telecommunication services; and (iii) national schedules of market access and national treatment commitments and lists of MFN exemptions.

The most important of the general obligations under the GATS are MFN (most-favoured-nation) (Article II) and transparency (Article III). They apply across the board to all services sectors, although exemptions to the MFN obligation in specific sectors were permitted at the time of entry into force of the agreement, and such exemptions, in principle, should not extend beyond 10 years. Specific obligations are related to market access and national treatment (Articles XVI and XVII, respectively). They apply only to services that are inscribed in the Schedules of Commitments of countries where specific commitments on market access and national treatment are listed in the form of limitations or measures applicable. Such limitations may be either horizontal (cross-sectoral) or sector-specific, and are listed for each of the four modes of supply. Moreover, Article XVIII offers the possibility for countries to inscribe additional commitments not dealt with under the two previous articles.

³⁰In the following, the term "product" is used in a broad sense, including all types of Internet-based transactions.

discusses the importance of protecting copyrights and related rights, and trademarks and domain names for the future development of electronic commerce. The final part examines regulatory issues relating to electronic commerce from a WTO perspective.

A. Access to the Internet

Greater availability of and access to infrastructure is a sine qua non of participation in electronic commerce via the Internet

Electronic commerce cannot be conducted without access to two essential infrastructural components. First, the necessary hardware and software must be in place to allow information to flow. Second, there must be access to communication networks. Some of the products and technologies involved are undergoing rapid change, they are becoming more widely available, and prices are falling fast. Technological development will continue at a fast pace, as technology improves and markets grow. While improved access opportunities are obviously influenced by technological progress, government policies also play a significant role. Governments help to determine whether and under what conditions producers and consumers can take advantage of electronic commerce.

Access to the infrastructure needed for electronic commerce depends in part on adherence to certain WTO rules by Members and their commitments to specified conditions of market access. Brief mention is made here of three aspects of these rules and commitments. First, the Information Technology Agreement removes a range of tariffs on information technology products essential to the infrastructure for electronic commerce and the Internet. Second, commitments on market access, national treatment and regulatory principles in the basic telecommunications sector have been negotiated under the auspices of the GATS. Third, the GATS Annex on Telecommunications guarantees access to and use of public telecommunications networks and services. The treatment here of policy issues relevant to Internet access is not exhaustive. Intellectual property-related questions concerning access to infrastructure, for example, will be referred to in the sixth part of this section below. Moreover, some of the issues dealt with here, such as market access and national treatment for telecommunications services and the Annex on Telecommunications are relevant not only to infrastructure access, but also to the supply of services using the infrastructure. The latter issue is taken up in more detail in subsequent parts of the section.

The Information Technology Agreement is removing tariff barriers on a wide range of infrastructure products essential to electronic commerce

On 13 December 1996, on the occasion of the WTO's first Ministerial Conference, which was held in Singapore, a total of 28 WTO Members and States or separate customs territories in the process of acceding to the WTO³¹ signed the Ministerial Declaration on Trade in Information Technology Products. Acknowledging the importance of technology products to the development of information industries and the dynamic expansion of the world economy, the Declaration's intention was to achieve maximum freedom of world trade in information technology products and to encourage continued technological development on a world-wide basis. Signatories agreed to bind and eliminate customs duties and other duties and charges on a wide range of products (Box 10). Subsequent to the Singapore meeting, a further 14 countries have become part of the ITA, and the numbers are expected to continue to rise.³² The total of 28 ITA participants as at 31 October 1997, covering 43 Members and States or separate customs territories in the process of acceding to the WTO,³³ account for approximately 93 per cent of world trade in information technology products.

In the Ministerial Declaration, it is stated that the elimination of customs duties was envisaged to take place in four stages, with the final stage being completed no later than 1 January 2000, unless otherwise agreed among participants. Some countries were granted extended staging beyond 2000, but in no case later than 2005. The extent of tariff reductions implied by the ITA is indicated in Chart 11 for a number of the countries participating in the agreement. Applied rates in 1996 ranged from 0 to 15 per cent for a considerable share of ITA-related imports in most signatory countries, and exceeded 15 per cent for almost all imports in India. Only Iceland, Singapore and Hong Kong, China reported tariff free treatment for all or almost all imports covered by the ITA Agreement.

The Committee of Participants on the Expansion of Trade in Information Technology Products has discussed some elements of possible future work. These include further examination of divergences in the classification of products included in the ITA, a continuing review of product coverage, and consultations on non-tariff barriers affecting trade in information technology products. Thus, it may be expected that the WTO will continue to work towards achieving the objective of "maximum freedom of world trade in information technology

³¹Australia; Canada; European Communities (15 Members); Hong Kong, China; Iceland; Indonesia; Japan; Korea; Liechtenstein; Norway; Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu; Singapore; Switzerland; Turkey; and United States.

³²The new additions include the Czech Republic, Costa Rica, El Salvador, Estonia, India, Israel, Macau, Malaysia, New Zealand, Philippines, Poland, Romania, Slovak Republic, and Thailand.

³³The difference between the numbers 28 and 43 is accounted for by the 15 EU Member States.

Box 10: Product coverage under the Information Technology Agreement

The products covered by the Declaration, also referred to as the Information Technology Agreement (ITA) include semiconductors, telecommunication products, scientific instruments, computer software and semiconductor manufacturing equipment. Semiconductors include chips and wafers of various size and capacity. Telecommunication products include telephone sets, radio-broadcasting and television transmission and reception apparatus, pagers, videophones, fax machines, switching apparatus, and modems. Scientific instruments include measuring and checking devices, chromatographs, spectrometers, optical radiation devices, and electrophoresis equipment. Computers include processing units, keyboards, printers, monitors, scanners, and hard disk drives. Software refers to the carrier media on which the software is contained, such as diskettes, magnetic tapes and CDs, which is the way in which software is classified under the Harmonized System of tariff nomenclature. Semiconductor manufacturing equipment includes a wide variety of equipment and testing apparatus used in the production of semiconductors. Finally, a range of products covered that do not fit into any of the above categories include word processors, calculators, cash registers, ATM machines, certain static converters, indicator panels, capacitors, resistors, printed circuits, conductors, optical fibre cables, photocopiers, computer network equipment, and flat panel displays. This long, but still non-exhaustive list provides some idea of how wide-ranging the ITA is in terms of product coverage.¹

¹For further details of the initial product coverage of the ITA, see WTO (1996) (Ministerial Declaration on Trade in Information Technology Products, 13 December 1996).

products”, as spelled out in the Ministerial Declaration on Trade in Information Technology Products (WTO, 1996).

Commitments under GATS on the liberalization of trade in basic telecommunication services ensure better access to the essential infrastructure for electronic commerce

When the Uruguay Round negotiations closed with the adoption of the Marrakesh Declaration of 14 April 1994, governments had already agreed to continue negotiations on trade in basic telecommunication services, which had been largely left aside, by agreement, as being politically unripe and technically too complex to be negotiated in the time available.³⁴ Governments hoped that by deferring the negotiations on basic telecommunication services, they would be able to take advantage of the rapidly changing situation in the sector, both in terms of the development of new technologies and regulatory reforms involving greater reliance on markets.

The distinction between basic and value-added telecommunication services was never formally drawn, but a shared view was developed on what would be considered basic services for the purposes of the basic telecommunications negotiations. Broadly, value-added services involve enhancement of the form or content of information by providing, for example, storage or retrieval. Examples of such services include on-line data processing and data base storage and retrieval, electronic data interchange, electronic mail and voice mail. By contrast, basic services included in the negotiations involved real time communication of customer-supplied information such as voice telephony and data transport services, with no change in form. Some governments included value-added services in their market access commitments that emerged from the extended negotiations.

Earlier, 55 governments had already made commitments on value-added services, in the context of the completion of the Uruguay Round.

The extended negotiations were finally completed in February 1997, resulting in commitments by 69 governments (comprising 55 schedules and counting the European Communities as one). Almost all participants made commitments in most sub-sectors (see Box 9 above for an explanation of the structure of GATS). It is noteworthy that many of the negotiated undertakings entail precommitment to liberalization in the future, a fact which emphasizes how the GATS negotiations have been used to consolidate the liberalization process.

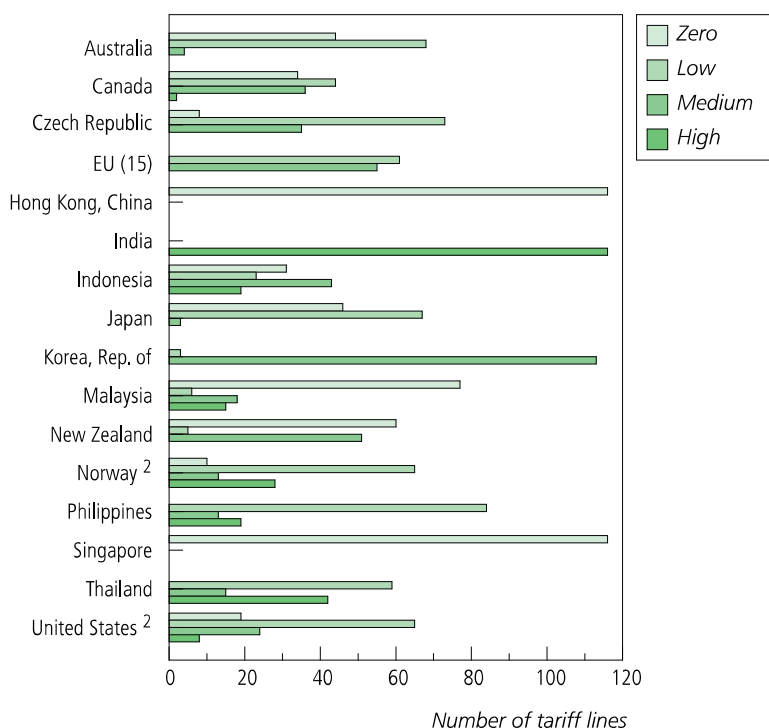
The coverage of the supply of Internet access services in commitments under GATS may require clarification

It is not always clear from Members' GATS schedules how far market access and national treatment commitments cover the supply of Internet access services. A distinction must be borne in mind here between the supply of Internet access services, and the supply of other services using the Internet as a medium of delivery. The concern here is with the former, while the latter is discussed in Section VI.B. Ten countries made explicit commitments on the supply of Internet access services in the context of the GATS negotiations on basic telecommunications services. This is not to say, however, that the absence of a mention of such commitments implies that market access opportunities do not exist.³⁵ It may also be the case that such opportunities, though not mentioned explicitly in schedules of specific commitments, are contained implicitly in a broader definition of basic telecommunications services which are subject to legally binding access commitments.

³⁴This section draws heavily on WTO (1997).

³⁵This point applies generally to any service. Commitments guarantee specified conditions of market access. Their absence is not an indication of the denial of access, but merely the lack of binding GATS commitments on access.

Chart 11: ITA Tariffs, 1996 Applied Rates, Selected Countries¹



Notes:

¹Low: 0-5; Medium: 6-15; High:>16.

²Specific tariff rates assumed to be between 0 and 5. These include 27 products in Norway and 8 in the United States.

Where a Member has undertaken to open up the entire basic telecommunications sector to competition, it would appear reasonable to assume that such a commitment would encompass suppliers of Internet access services. There may then be no need to mention explicitly this particular basic telecommunications service. If, on the other hand, a Member commits to liberalize the basic telecommunications sector partially, then a specific mention of Internet access services might be required if this particular activity were to be liberalized. This interpretation would seem to be confirmed by the fact that explicit mention of Internet access services is found mostly in the schedules of Members who have retained, at least for the time being, some monopolistic control or other market access limitations in respect of the supply of basic telecommunications services.

In this connection, it is worth noting that the Chairman of the Group of Basic Telecommunications issued an interpretative note in January 1997³⁶ to the effect that in the absence of any indication to the contrary, a commitment on a given sector was assumed to cover local, long-distance and international services for public and non-public use, on a facilities or resale basis, and us-

ing any technological means of supply. The interpretative note also indicated that any commitment on private leased circuit services, unless otherwise indicated, would permit suppliers to sell or lease any type of network capacity for the supply of services listed in any other telecommunications service subsector. However, in view of the fact that some doubts may remain as to the precise degree to which suppliers of Internet services are covered by scheduled commitments, not least because the Chairman's interpretative note referred to above does not have formal legal status, there might be a case for securing further clarification of this matter among Members.

The WTO Annex on Telecommunications guarantees access to and use of public telecommunications transport networks and services

The Annex on Telecommunications contains provisions designed to protect users of telecommunication services.³⁷ The core provisions of the Annex deal with access to and use of public telecommunications transport networks and services (PTTNS). Paragraph 5(a) of the annex states that:

³⁶S/GBT/W/2/Rev.1.

³⁷Bronckers and Larouche (1977) and Tuthill (1996, 1997).

“Each Member shall ensure that any service supplier of any other Member is accorded access to and use of any PTTNS on reasonable and non-discriminatory terms and conditions, for the supply of a service included in its Schedule.”

Thus, the Annex requires that governments oblige suppliers of PTTNS to grant access to and use of PTTNS within or across the border, including private leased circuits, to service suppliers with market access rights under GATS. This obligation is without prejudice to, inter alia, confidentiality of transmissions, the provision of universal service, and the protection of the technical integrity of networks.

Two additional points are worth noting about the provisions of the Annex. First, these obligations apply regardless of whether a Member has undertaken to liberalize access to its basic telecommunications sector under GATS. This is because the Annex aims at guaranteeing access to and use of telecommunications networks and services in respect of any service upon which a Member has undertaken specific market access commitments. Thus, a supplier of banking services, for example, who is benefitting from a specific commitment under GATS would be guaranteed the necessary access to and use of PTTNS. Secondly, if a specific commitment is made in the telecommunications sector itself, then a competing supplier of telecommunications services, whether basic or value-added, benefitting from such a commitment would be entitled to access to and use of established networks and services in just the same way as a supplier of any other service. For basic telecommunications services suppliers, including suppliers of Internet services, this amounts to an interconnection right. In the basic telecommunications negotiations, however, many participants were of the view that more explicit and detailed regulatory provisions were needed in order to ensure adequate market access for new market entrants, especially in situations where dominant suppliers might be tempted to undermine commitments by governments to open up markets for basic telecommunication services.

[GATS Articles VIII and IX and the Reference Paper on Regulatory Principles guard against the impairment of market opportunities through the denial of access to networks](#)

It was apparent at the outset of the negotiations that the existence of monopolies and high levels of concentration in the market for basic telecommunications services could undermine or even negate commitments by governments to open markets. Monopolistic suppliers could frustrate competition from new entrants in any number of ways. The problem was made more acute by the fact that in the absence of parallel infrastructure, effective participation by new suppliers in the market

would require that a dominant supplier permit competitors to gain access to its network on commercial terms.

Article VIII on monopolies and exclusive service suppliers complements the Annex on Telecommunications to prevent anti-competitive behaviour. Article VIII prevents a monopoly supplier from acting in a manner that denies non-discriminatory treatment to all other Members and from undermining specific market access commitments. The Article also contains provisions against cross-subsidization practices that adversely affect the conditions of competition in a sector where a Member has accepted a specific commitment. In addition, Article IX of GATS recognizes that anti-competitive business practices may restrain competition and thereby restrict trade. The Article provides for consultations aimed at eliminating any business practices of this nature.

In addition, Members saw the need for further regulatory principles, which were formulated in a Reference Paper during the basic telecommunications negotiations between 1995 and early 1997. The regulatory principles apply in situations where major suppliers exercise control over essential facilities or are capable of abusing a dominant position in the market. Essential facilities are facilities exclusively or predominantly provided by a single or limited number of suppliers, and which cannot feasibly be substituted economically or technically in order to provide a service.

The regulatory principles impose an obligation to prevent anti-competitive cross-subsidization and the misuse of information. Major suppliers are obliged to provide interconnection on non-discriminatory terms, conditions and rates and of a quality no less favourable than that provided to all other suppliers of like services, including their own affiliates. Interconnection must also be granted in a timely manner, on terms and conditions and at cost-oriented rates that are transparent and reasonable, and sufficiently unbundled so that a supplier does not have to pay for unnecessary network components or facilities. Interconnection procedures must be made publicly available. Service suppliers requesting interconnection with a major supplier may appeal to an independent domestic body to resolve disputes regarding interconnection terms and conditions. The right of governments to provide for universal service is recognized, but this must be done in a way that does not confer a competitive advantage upon any supplier. Licensing criteria and the terms and conditions of licenses must be made publicly available, regulators must be impartial and independent of suppliers, and the allocation of scarce resources such as frequencies and rights of way must be timely, objective, transparent and non-discriminatory.

All participants in the negotiations were invited to subscribe to the Reference Paper. Sixty three of the 69 governments that made specific commitments in the

negotiations also included commitments on regulatory disciplines. Of these 63 governments, 57 accepted the Reference Paper in its entirety, or with only minor modifications. The remaining six governments accepted only some regulatory disciplines, or made more significant modifications to the Reference Paper. Taken together, the regulatory principles and the GATS Annex on Telecommunications provide an essential degree of confidence that access to the necessary infrastructure for conducting electronic commerce will not be frustrated through anti-competitive behaviour. Should such behaviour become apparent, Members have the right, on behalf of affected suppliers, to seek redress through the WTO's dispute settlement machinery.

B. Market access issues

Open international market access is essential to the realization of benefits from electronic commerce, and governments will need to address this question. The WTO already has market access regimes in place — the GATT for trade in goods and the GATS for trade in services. A question that arises is whether either (or both) of these regimes provide an adequate framework for dealing with market access and electronic commerce. No public international discussion of this issue appears to have taken place so far, and the discussion below attempts to lay out some of the options and their possible consequences.

In this context, a recent market access proposal by the United States in regard to electronic commerce should be noted. This proposal, presented to the WTO General Council on 19 February 1998, calls for agreement among WTO Members "to maintain ... current practices not to impose duties on electronic transmissions." The U.S. proposal is rooted in the observation that no government considers that electronic transmissions are importations for customs duty purposes, and the idea is to consolidate this duty-free status quo. Since the focus is only on the electronic transmission of digitalized information (and not on goods delivered by physical means after being purchased over the Internet), and only concerns customs duty treatment (and not any other taxes), it is possible for the proposal to be considered independently of any further judgements as to the desirable policy regime for electronic commerce over the Internet. Another initiative that goes in the same direction is an agreement reached on 5 December 1997 between the EU and the United States by which both parties undertake "... to work towards a global understanding, as soon as possible, that: (i) when goods are ordered electronically and delivered physically, there will be no additional import duties in relation to the use of electronic means; and (ii) in all oth-

er cases relating to electronic commerce, the absence of duties on imports should remain."

A point about electronic commerce as a medium, which applies to policy interventions in general, is that it will not always be straightforward to identify the content of transmission in situations where governments have a fiscal, protection-related or regulatory motivation for doing so. Addressing this issue may well involve international cooperation, in addition to finding technical solutions. But it may also raise questions regarding the best instrument to employ. In the case of market access, for example, the objective of finding a margin of commercial advantage for a domestic supplier over a foreign supplier may be better served by an approach that emphasizes promotion over protection.

The way electronic commerce is characterized in WTO terms will influence the policy regime for electronic commerce

Electronic commerce could be characterized as trade in goods, trade in services, or as something different from either of these. The discussion here focuses on electronic commerce that involves separate jurisdictions, or in other words is international. A further distinction that may be useful to bear in mind is between electronic transmission per se, and the content of electronic transmissions. The U.S. proposal referred to above, for example, deals with customs duty treatment of electronic transmissions, and is not concerned with distinguishing electronic transmissions in terms of what they contain.

When considering options for how to address electronic commerce, key differences between the GATT and GATS must be borne in mind. The GATT regime embodies at least four significant differences in comparison to GATS. First, the GATT contains a general obligation in respect of national treatment, as opposed to one that depends on what specific commitments have been made at the sectoral level, as in the GATS. Second, the GATT embodies a general prohibition on quantitative restrictions (with delineated exceptions), whereas the GATS permits the use of quantitative restrictions in cases where governments wish to maintain limitations on market access. Third, the GATT envisages the use of customs duties on imports where Members have not bound their tariffs at zero, whereas the GATS has little to say about customs duties, or taxes in general, except that any tax regime must be consistent with a Member's national treatment commitments in its schedule of specific commitments. Fourth, the GATT focuses on cross-border trade in goods. The GATS also covers cross-border trade, but additionally considers commercial presence within a foreign jurisdiction and "establishment" trade, as well as movement of natural persons, as part of trade in services.

The content of only certain digitalized information flows on the Internet might be seen as resembling trade in goods

Assume that the case is made for treating all electronic commerce as goods, and therefore that the GATT regime would apply. The goods approach might make sense when considering some of the products³⁸ that are deliverable as digitalized information over the Internet, but which we are accustomed to thinking of as goods. An obvious example of this would be a book, a product which is clearly identified in the customs classification systems for goods. The contents of a book could be transmitted electronically from one jurisdiction to another and then transformed into a book in the normal physical sense. The argument would be that since a book is a good, it makes sense to treat the electronic transmission of a book's contents as trade in goods.

This argument seems reasonable as far as it goes, but many digitalized information flows are not readily convertible into a physical format that is recognizable as a standardized good. Indeed, it appears that statistical conventions for balance-of-payments purposes distinguish between standardized and non-standardized products. A book or a mass consumption "over-the-counter" software package, for example, are standardized products considered to be goods. But customized data on a CD, or customized software, would be treated as non-standardized products and classified as services. A similar distinction would seem relevant in considering electronically-delivered professional services, for example, where changing the product from digitalized information to a physical format does not yield a product typically thought of as a good. Would, for example, a medical diagnosis printed on a sheet of paper be regarded as a good for customs duty purposes if it were carried physically over a frontier rather than being delivered digitally?

A range of other digitalized information flows could not be given a physical form at all. This would obviously be the case where a product was both delivered and consumed in real time. An anti-virus software programme, for example, or voice telephony, would be "consumed" while being sent.

A range of transactions carried out through electronic commerce are already covered under the structure and trade liberalization commitments of the GATS

As already noted, the provision of Internet services is covered by the GATS, and is therefore amenable to negotiation, liberalization and regulation under the GATS.

Moreover, many products which can be delivered between jurisdictions as digitalized information flows are classified as services, and a number of important services are already traded electronically. In some cases, Members have already made commitments with respect to these services under the GATS. It is with these considerations in mind that Section VI.C below considers briefly the question of how much trade liberalization has taken place under the GATS that may be considered relevant to electronic commerce.

This question of coverage is complicated by factors relating to the classification of services and nomenclature. No compulsory or universally agreed classification system exists for services under GATS. In many instances, Members have chosen to follow the nomenclature developed for GATS purposes (GNS/W/120), which in many sectors is based on the provisional Central Products Classification (CPC) of the United Nations. The CPC nomenclature was not, however, used as the classification basis in a number of sectors, including financial services, telecommunications, air transport and maritime transport. Nevertheless, the mention of a CPC heading in the first column of a GATS schedule can clarify the product description, and hence the precise scope of a commitment.

The CPC comprises a nomenclature at the five-digit level and a series of definitions describing each of the headings listed in the nomenclature. While the intention behind the CPC is to provide an exhaustive classification system, in practice resort is often made to the description "other services". CPC descriptions are usually technologically neutral, focusing on the end-use of the service concerned rather than the means or medium of delivery, but this is not always the case. The current version of the CPC (due to be revised in 1998) was issued in 1989, and therefore could not anticipate subsequent technological developments.

In sum, two situations exist in which doubt arises as to whether a commitment exists with regard to the electronic provision of a service. First, a CPC description (or an entry not based on the CPC) may not be technology-neutral. That is, it may describe exhaustively the means of delivery without mentioning electronic means. Secondly, in the absence of an appropriate CPC heading, it may not be clear that a particular service is covered. This situation would seem to arise, *inter alia*, in the case of new services which were non-existent when commitments were entered into. Given that the GATS approach to product definition is based on a positive listing, it is questionable whether the "other" category can be treated as including new services.

³⁸Recall that we use the word "product" in this study indistinguishably as between goods and services.

If certain transactions over the Internet were to be seen neither as trade in goods nor trade in services, new rules may be required or existing ones may need to be revisited

The idea that certain digitalized information flows over the Internet cannot be characterized as either trade in goods or trade in services raises important questions as to the applicable regime for such transactions. If the position taken is that existing WTO rules are inadequate, a question remains as to how far there is a need for new rules, or whether existing ones could be reformed, extended or interpreted in ways that would meet the needs of burgeoning commercial activity over the Internet and similar media.

Whatever Members decide about the appropriate characterization of electronic commerce, it would seem important to ensure a policy outcome which does not distort economic decisions

For historical reasons, rules on trade in goods and trade in services evolved separately. The two sets of rules are similar in many ways, but they contain important differences. An interesting question is how far these variations correspond to intrinsic differences between goods and services that call for distinct approaches to rule-making, and how far they reflect differences that cannot be so justified. To the extent that the latter might be the case, a further question is whether the differences distort incentives for producers or consumers, leading to inefficiency. The incidence of this kind of friction between the GATT and GATS is probably not great because of the reasonably clear line that can be drawn in most cases between goods and services.

But when it comes to electronic commerce, some of this clarity evaporates. Products which can be rendered identical, but which might be labelled goods, services or something else, can find their way from a supplier in one jurisdiction to a consumer in another by quite different means. If the policy environment makes distinctions, say in treatment for customs duty purposes, purely on the basis of the medium of conveyance of a product, then an economic distortion enters the picture. Preventing such distortions and maintaining policy neutrality should therefore be kept in mind in future discussions about electronically delivered products.

C. Trade liberalization under GATS

For the purposes of electronic commerce, we can think of services sectors as falling into at least four non-overlapping categories: first, there are the sectors which

help in the development of the infrastructure for electronic commerce, notably telecommunications and computer and computer-related services, discussed in Section VI.A above; secondly, there are the sectors where the services can actually be delivered electronically, which include, for example, business, entertainment and financial services; thirdly, there are the sectors which are complementary to all commerce, including electronic commerce, such as postal, courier and transport services; and finally, there are the sectors which would benefit from electronic information flows more generally, i.e., through lower search costs, faster data transmission, electronic processing of administrative forms etc.

Our interest in this section is primarily in the GATS commitments made with respect to the second category, which covers the electronic delivery of services. It is difficult to define precisely the services that fall in this category, which, moreover, is expanding constantly with new technological developments. Mention is also made at the end of this section of the third category identified above. Finally, services in the fourth category which cannot be delivered electronically are easier to define. They clearly include most construction services, environmental services (like sewage and waste disposal), hospital services, hotel and restaurant services, and transport services.

The most relevant modes of delivery for electronic commerce are cross-border supply and consumption abroad

The two modes of delivery most relevant to the supply of services over the Internet are cross-border supply (mode 1) and consumption abroad (mode 2). As indicated in the agreed scheduling guidelines (MTN.GNS/W/164 of 3 September 1993), the modes of supply are essentially defined on the basis of the origin of the service supplier and consumer, and the degree and type of territorial presence which they have at the moment the service is delivered. In both modes 1 and 2, the supplier is not present within the territory of the Member. The distinction between modes 1 and 2, therefore, hinges upon whether the service is delivered within the territory of the Member from the territory of another Member or whether the service is delivered outside the territory of the Member. Hence, the distinction between the two modes is not always clear. Since the physical presence of the consumer is not a criterion for determining the place of delivery of a service, it sometimes becomes difficult to determine in an unambiguous manner where the service is delivered. We do not attempt to provide a solution to the question of how electronic commerce should be categorized according to modes of supply.³⁹ Rather it

³⁹See document MTN.GNS/W/164. WTO document S/FIN/W/9 discusses the problems of making the distinction between the first two modes in the case of certain financial services.

Table 11: GATS Commitments on Mode 1 and 2 Trade for Various Service Sectors

Sector/Subsector	Number of Countries	Market Access						National Treatment					
		Cross-Border Supply (%)			Consumption Abroad (%)			Cross-Border Supply (%)			Consumption Abroad (%)		
		Full ¹	Part ¹	No ¹	Full ¹	Part ¹	No ¹	Full ¹	Part ¹	No ¹	Full ¹	Part ¹	No ¹
BUSINESS SERVICES													
A. Professional	74	19	17	64	25	18	57	14	10	76	18	9	73
B. Computer and related	62	40	22	37	48	21	31	25	9	66	29	8	62
C. Research and development	37	37	14	49	34	18	48	24	7	68	23	9	67
D. Real estate	18	50	36	14	67	28	7	30	18	53	42	6	53
E. Rental/leasing	39	28	14	56	36	20	44	20	9	70	23	11	66
F. Other business	71	16	14	71	18	14	68	13	8	80	15	8	77
COMMUNICATION SERVICES													
A. Postal	6	67	33	0	83	0	17	67	33	0	83	0	17
B. Courier	33	39	33	27	48	39	12	42	33	24	52	33	15
C. Telecommunication	57	11	25	63	15	21	63	12	14	75	11	11	78
D. Audiovisual	19	11	23	66	16	28	57	14	10	77	14	13	74
DISTRIBUTION SERVICES													
A. Commission agents ¹	21	10	70	20	20	70	10	10	75	15	20	75	5
B. Wholesale trade	34	27	55	18	36	52	12	30	55	15	36	55	9
C. Retailing	33	24	52	24	30	58	12	21	55	24	27	61	12
D. Franchising	22	64	36	0	64	27	9	59	36	5	59	32	9
E. Other	3	50	50	0	50	50	0	50	50	0	50	50	0
EDUCATIONAL SERVICES													
A. Primary education	21	45	25	30	60	25	15	40	40	20	55	35	10
B. Secondary education	23	45	41	14	64	32	5	41	50	9	59	36	5
C. Higher education	20	60	30	10	60	30	10	40	50	10	45	45	10
D. Adult education	20	50	45	5	50	50	0	40	55	5	40	60	0
E. Other education	12	33	67	0	42	58	0	42	58	0	42	58	0

Table 11: GATS Commitments on Mode 1 and 2 Trade for Various Service Sectors (continued)

Sector/Subsector	Number of Countries	Market Access						National Treatment					
		Cross-Border Supply (%)			Consumption Abroad (%)			Cross-Border Supply (%)			Consumption Abroad (%)		
		Full ¹	Part ¹	No ¹	Full ¹	Part ¹	No ¹	Full ¹	Part ¹	No ¹	Full ¹	Part ¹	No ¹
FINANCIAL SERVICES													
A. All insurance and insurance-related	73	17	31	52	19	32	49	21	23	56	24	21	55
B. Banking and other financial	73	15	24	61	26	33	42	18	19	63	27	27	46
C. Other	8	13	38	50	0	25	75	13	38	50	0	25	75
TOURISM AND TRAVEL-RELATED SERVICES													
A. Travel agencies/tour operators	86	50	17	33	67	17	15	50	19	31	64	19	17
B. Tourist guides	52	55	8	38	77	13	9	51	13	36	74	15	11
C. Other	13	38	31	31	38	54	8	46	31	23	54	46	0
RECREATIONAL, CULTURAL AND SPORTING SERVICES													
A. Entertainment	28	63	11	26	81	11	7	67	11	22	81	11	7
B. News agency	14	71	21	7	79	21	0	57	43	0	71	29	0
C. Libraries, archives, museums and other cultural	13	54	23	23	62	38	0	54	31	15	62	31	8
D. Sporting and other recreational	34	54	23	23	62	38	0	54	31	15	62	31	8
E. Other	1	100	0	0	100	0	0	100	0	0	100	0	0
COMPUTER AND RELATED SERVICES													
a. Consultancy service related to the installation of computer hardware	51	57	20	24	67	18	16	51	22	27	61	20	20
b. Software implementation	56	54	27	20	64	25	11	48	29	23	59	27	14
c. Data processing	54	54	26	20	65	24	11	46	31	22	59	28	13

¹Full: full commitment; Part: partial commitment; No: no commitment.

Note: Percentage may not add up to 100 due to rounding.

seems appropriate to examine the commitments made by Members under each of the two modes,⁴⁰ bearing in mind that the distinction between mode 1 and mode 2 may be important for legal reasons in both a jurisdictional sense, and in terms of whether or not a Member's commitments cover a given means of delivery.

Commitments under GATS create security of market access

Before turning to the quantitative analysis of commitments it is worthwhile considering the implications of liberal market access and national treatment commitments for the electronic provision of services. A full commitment on market access is a guarantee that no quantitative restrictions will be imposed, for instance on the volume or value of supply of a particular service. It is questionable to what extent such restrictions could in practice be imposed on electronic commerce even in the absence of liberalizing commitments. Nevertheless, a commitment provides a guarantee that restrictions will not be imposed even where they are technically feasible. A full national treatment commitment provides assurance that there will be no discrimination through domestic regulations or taxation. This does not necessarily guarantee access free of any restrictions, but it does ensure that foreign services and service suppliers will not be subject to more burdensome regulation or taxation than domestic services and service suppliers.

In examining the level of commitments for the different sectors and modes of supply, three degrees of commitments to liberalization can be distinguished.⁴¹ First, there are "full" commitments assuring unrestricted access. These are reflected in a "none" entry against a particular mode of supply in the schedule; second, there are "partial" commitments which refer to those entries which are conditioned in some way by a limitation;⁴² and third, there are "no" commitments which are expressed by an "unbound" entry against the relevant mode, and offer no guarantee of market access.

Commitments under modes 1 and 2 for the relevant service sectors are surveyed in Table 11. While the tables present information on both market access and national treatment, the analysis of the levels of commitment focuses a good deal on market access limitations. The reason for this is not only because of the importance of market access limitations for foreign service suppliers at the stage of entry, but also because any measures inconsis-

tent with both Article XVI (market access) and Article XVII (national treatment) are scheduled in the market access column of the schedule in accordance with Article XX:2. As a consequence of this scheduling convention, the entry "none" in the national treatment column may not necessarily be taken to mean a full commitment to national treatment in cases where market access limitations also constitute limitations on national treatment. This makes it difficult to assess the degree of commitment to national treatment.⁴³

In Table 11, the first column indicates the relevant sector, while the second column shows the number of countries which have made commitments on at least one sub-sector of a particular sector. Thus 74 countries have made commitments on at least one type of professional service (legal, accounting, taxation, etc.). The third, fourth, and fifth columns indicate the level of market access commitments made on cross-border supply in a particular sector. The next three columns provide the same information on consumption abroad. The last six columns provide the same information for national treatment commitments. A relatively large percentage of "no" commitments for a particular sector and mode could mean not only that Members have been unwilling to make commitments with respect to a sub-sector listed in their schedules (say legal services within professional services), but also that a large number of sub-sectors may not have been listed at all.

Table 11 tends to understate the economic significance of commitments for two reasons. First, large developed economies tend to have made more (liberal) commitments than small developing economies, but the table counts each country as one and does not take the relative economic importance of countries into account. Secondly, more commitments have been made in the larger sub-sectors than the smaller sub-sectors, but the table counts each sub-sector as one, and does not take into account differences in their economic importance.

Keeping these qualifications in mind, several broad features emerge. More than half of the WTO Membership of 130 made commitments in 5 of the sectors considered here: professional services, other business services (which includes advertising), insurance services, banking and other financial services, and travel agencies and tour operators. Commitments are generally more liberal with respect to consumption abroad than with respect to cross-border supply. This would seem to imply that coun-

⁴⁰For more discussion on this issue and the related jurisdictional questions on Internet transactions, see also previous section V.B.

⁴¹The database is still in the process of being developed and has not been authorized or endorsed by WTO Members. The responsibility for any errors or omissions lies entirely with the authors.

⁴²The database attempts to categorize the partial commitments into those that are partial in modal coverage, those that are geographically partial, those that are sectorally partial, and those that are fully bound in each of the above dimensions, but which carry other limitations, such as upon the value of the service that can be supplied. For reasons of space, and because of the need to perfect analysis along these lines in the database, these sub-categorizations have not been included in the study.

⁴³It is not always evident from the entries in the market access column which measures simultaneously constitute limitations on national treatment and which do not. The extent to which a limitation in the market access column would affect the commitment indicated in the national treatment column is also debatable. Given this ambiguity, the tables on the levels of commitment in national treatment are based on the actual entries in the national treatment column, and no account has been taken of the measures scheduled in the market access column. Clearly, this approach distorts the results of the analysis. For a discussion of these issues, see Mattoo (1997).

tries are willing to adopt a more liberal approach to transactions which take place outside their territory. The percentage of fully liberal commitments on cross border supply with respect to each sector exceeds 50 per cent in postal services, franchising, higher education services and tourist guide services. These findings suggest that in certain sectors, considerable use has already been made of the GATS framework to create security of market access, but there remains significant scope for widening and deepening the range of commitments.

Other patterns which emerge from the scheduled commitments include:

- In computer and related services (which include software implementation, data processing and data base services), 62 countries have made commitments, and 40 per cent of the possible commitments guarantee fully liberal cross-border access.
- In telecommunication services, the Table only shows the Uruguay Round commitments undertaken by Members and not the commitments undertaken in the extended negotiations which are yet to come into effect. If we include both sets of commitments, we find that in basic telecommunications, 55 countries made commitments on voice telephone services, with 11 per cent guaranteeing unrestricted cross-border supply. Around 50 countries made commitments on data-transmission services of which 15 per cent of the commitments assure an absence of barriers to cross-border supply. The picture with respect to other basic telecommunications services is similar. Over 50 countries made commitments with respect to each of the value added telecommunications services like electronic mail, on-line information and data-base retrieval, and electronic data interchange. Around a quarter of these commitments represent bindings without restrictions on cross-border supply and consumption abroad.
- A relatively small number of countries (19) have made commitments on audio visual services. Eleven per cent of these countries guarantee fully liberal cross-border access.
- A relatively large number of countries have made commitments on insurance and banking and other financial services, though there is considerable variation in the degree of sub-sectoral coverage. Unrestricted cross-border commitments in insurance, and in banking and other financial services have been made by 17 and 15 per cent of the countries, respectively.⁴⁴

- Commitments on professional services have been made by 74 countries, and fully liberal cross-border access with respect to each sub-sector is guaranteed in 19 per cent of cases.
- A relatively small number of countries have made commitments on distribution services: 34 on wholesale trade and 33 on retailing services. Around a quarter of the commitments represent full binding of unrestricted market access on cross-border supply and consumption abroad.
- The number of commitments on education services is also small: only 20 countries made commitments regarding higher and adult education, with 60 and 50 per cent of these countries assuring liberal market access on modes 1 and 2 respectively.
- A large number of countries (86) have made commitments on travel agency services of which half guarantee unrestricted cross-border supply and two-thirds unrestricted consumption abroad.
- Few countries have made commitments on entertainment services (28) and news agency services (14). However, amongst those who have made commitments, the share with full cross-border commitments is quite high, at 63 and 71 per cent of the countries, respectively.

It should perhaps be emphasized that the absence of commitments does not mean that there are restrictions on trade. It is quite likely that in many countries which have not made commitments, there are in fact no barriers to electronic commerce. The value of GATS commitments is in providing a guarantee that this openness will be maintained.

Liberalizing commitments on services complementary to electronic commerce can contribute to its development

Many goods and services cannot be delivered electronically. Even if the advertising, order and payment are made electronically, they must rely on traditional modes of delivery. Postal, courier and transport services are, therefore, to some extent complementary to trade in general, and high costs for these services can inhibit the development of all commerce, including electronic commerce (see previous Section IV.D, and Table 10). It may therefore be useful to review briefly commitments under the GATS on these services. In contrast to the previous discussion, we are now not only interested in commitments under modes 1 and 2, but also in how far countries are willing to allow commercial presence and the movement of natural persons, in order to increase com-

⁴⁴These figures refer to the commitments made in financial services before the most recent round of negotiations. The pattern of commitments on cross-border supply has not changed significantly. The figures here differ slightly from those presented in Kono et al. (1997) because of a change in the method of calculation.

petition and the efficiency of service provision in these sectors.

Postal services remain a public monopoly in most countries. Only 6 countries have made commitments under GATS on postal services, all of which are small developing countries. The commitments tend to be liberal as far as cross-border supply and consumption abroad are concerned, but more restrictive on commercial presence and the presence of natural persons. The somewhat more liberal regime with respect to courier services is reflected in the fact that a larger number of countries (33) have made commitments. The pattern of commitments is similar to, but relatively less liberal than those on postal services, with the share of "full" commitments being considerably lower.

The negotiations under GATS on various transport services have had limited success. Negotiations on maritime transport services were extended after the Uruguay Round but could not be successfully concluded and had to be suspended. International shipping is arguably already an open sector, but there is scope for liberalization in auxiliary services (e.g., cargo handling) and port services. Air transport services have for the most part been excluded from the GATS and the scope of multilateral trade disciplines. The existing duopolistic arrangements on most routes have prevented the emergence of genuine competition.⁴⁵ Only 21 countries have made commitments on road transport services under the GATS and 37 on rail transport. In most cases, there are significant restrictions on all modes of supply with the exception of consumption abroad.

D. Trade facilitation

Trade facilitation via electronic commerce can improve market access opportunities

The considerable potential for using electronic commerce to facilitate trade and customs administration has already been noted in Section IV.D above. Facilitation via this avenue can lead to considerable savings in overhead costs for traders and may enable small and medium-sized companies to engage for the first time in international transactions. Information-technology-based management of data which is received electronically from traders supports the application of modern risk assessment techniques, simplifying customs controls and yielding considerable savings in time and money for importers and exporters. The elimination of such "invisible" entry

barriers and cost factors ensures that the benefits of market access commitments are fully realizable.

In recent years, we have witnessed the growing use of EDI-based electronic systems for trade and customs administration, and more countries plan to facilitate trade in this manner. It should, however, be noted that an important drawback of EDI-based systems lies in their closed nature, where dedicated links are limited only to a selection of the involved government agencies and private parties. This is why many observers are now making the case for universally open Internet-based systems where all the involved parties from manufacturers to government agencies can send and receive relevant information through the Internet. While such an open system facilitates the exchange of trade-related data considerably, it still allows customs and other public authorities to define their data needs and the manner in which the data are used to perform critical government functions relating to monitoring, revenue collection and enforcement. The benefits of open networks are magnified if governments agree on common data elements for the submission of trade documentation based on UN/EDIFACT, instead of insisting on their own trade data formats. Work in this direction is under way in various international fora.

Given the benefits from using electronic commerce in trade and customs administration, the WTO has considerable interest in supporting any efforts towards trade facilitation. Ministers in Singapore in December 1996 therefore mandated the WTO, and in particular the Council for Trade in Goods, "to undertake exploratory and analytical work, drawing on the work of other relevant organizations, on the simplification of trade procedures in order to assess the scope for WTO rules in this area." The ensuing debate in the WTO has so far focused mainly on aspects related to customs and border crossing. Many elements connected with simple, transparent, and rational trade procedures are already contained in the WTO legal framework, e.g., Articles V, VII, VIII, X of the GATT 1947 as well as the Agreement on Import Licensing Procedures, the Agreement on the Implementation of Article VII of GATT 1994 (Customs Valuation Agreement), the Agreement on Preshipment Inspection, the Agreement on Rules of Origin, and the Agreement on Technical Barriers to Trade. Other aspects, pointing to the need for rational, modern, and trade friendly management procedures and documentation requirements have been raised in discussions by WTO Members in the Council for Trade in Goods.

⁴⁵In Europe, for instance, it has been estimated that only 6 per cent of the continent's routes are serviced by more than two airlines. The others are still controlled by pairs of national airlines.

E. Electronic commerce and public procurement

The development of electronic commerce is likely to have important implications for government procurement and international rules on government procurement. The increased use of electronic technologies could transform government purchasing procedures as the way is opened to electronic advertising, qualification, tendering, selection, payment and, in certain cases, delivery. Quite apart from making traditional procurement procedures and practices more efficient, there is a question as to whether electronic tools could open up new ways of conducting procurement, for example through electronic qualification procedures that would facilitate selective tendering, the tendering of framework contracts and the selection of off-the-shelf products from electronic catalogues. At the same time, government use of electronic commerce faces many of the same challenges as private use: ensuring data privacy and security, interoperability of systems, and resolving legal issues such as the acceptance of digital signatures and electronic receipts.

More and more governments are developing electronic means for procurement

While many countries around the world are seeking to harness electronic means of communication for the purpose of making public procurement procedures more efficient, they are at differing stages in this process. Some have yet to begin implementation; some others have, in whole or in part, adopted information technology, in particular the Internet, for publishing notices on procurement opportunities; some have gone further in also enabling tender documents to be ordered and maybe delivered through such electronic means; and some have already initiated pilot projects by which as much as possible of the procurement process, including all communications between purchasing entities and tenderers, are conducted electronically. The stage reached within individual countries varies according to entities, contract values and the types of products or services being procured.

Some of the most ambitious projects are under way in the United States and the European Community where electronic means for providing information on procurement opportunities are already in general use. In addition, in the United States, the Government has a programme to streamline procurement through "electronic commerce", using EDI networks which will be able automatically to update inventories, invoice customers, pay suppliers, advertise federal government requirements and perform many other tasks that are now time, labour, and paper intensive. It was estimated that electronic pur-

chasing could cut U.S. Federal procurement costs by 10 per cent and speed up delivery times by a third. In order to implement this programme, a government-wide Federal Acquisition Network (FACNET) is being established, which would open up the acquisition process to any business with a personal computer. In the European Community, work has begun on a pilot project named SIMAP (Information system for public procurement) which will create an electronic public procurement network aimed at making the process more efficient, more reliable, less time-consuming, and ultimately more cost-effective, both for procurers and suppliers. Similar projects are to be found in many other countries, including some developing ones.

Modifications in international rules may be needed to facilitate the development of electronic procurement

The main WTO rules that apply to government procurement are contained in the Agreement on Government Procurement (GPA) to which 26 WTO Members are signatories.⁴⁶ Article XXIV:8 of the GPA foresees consultations, and if necessary, negotiation of modifications to the Agreement as the use of information technology in government procurement develops further. The consultations should ensure, in particular, that (i) the use of information technology promotes the aims of open, non-discriminatory and efficient government procurement through transparent procedures; (ii) contracts covered under the Agreement are clearly identified; and (iii) all available information relating to a particular contract can be identified. This provision of the GPA further states that when a Party intends to introduce innovations, it shall endeavour to take into account the views expressed by other Parties regarding any potential problems.

Pursuant to this provision, the Committee on Government Procurement has initiated work which includes consideration of possible amendments to the provisions of the GPA to reflect recent developments in information technology. This work includes examination of whether procuring entities should have the option of using electronic means of publication and communication rather than hard copy ones and also whether the minimum periods that should be allowed to enable suppliers to bid could be reduced to reflect the speed of electronic communication. But there is also a view that the full implications of electronic commerce for government procurement and therefore for international rules in this area have yet to be appreciated.

One of the underlying concerns is the differential impact that the early substitution of electronic means of

⁴⁶Canada; European Community and its member States; Hong Kong, China; Israel; Japan; Korea; Liechtenstein; Netherlands with respect to Aruba; Norway; Singapore; Switzerland; United States.

communication for print could have on potential suppliers according to their respective levels of sophistication in the use of information technology and access to international networks. On the one hand, experience would seem to indicate that information technology is of great value to distant suppliers and smaller suppliers with fewer resources to identify and follow-up contract opportunities; it has the potential to redress somewhat their disadvantages vis-à-vis local and larger suppliers. It can therefore facilitate greater international competition in procurement processes, especially from developing countries, to the benefit not only of international trade but also of efficient procurement. However, these potential advantages are sometimes seen as being in tension with problems deriving from a temporary disadvantage in the use of information technology on the part of some smaller and, in particular, developing country suppliers. The management of this tension is likely to be an important component in reaching agreement on any modifications to the plurilateral Agreement and on the development at the multilateral level of any procedural rules relevant to the use of information technology that may result from the recently created WTO Working Group on Transparency in Government Procurement.

A further issue is whether cooperation at the inter-governmental level is called for to facilitate mutual access to and use of the various electronic procurement systems by promoting interoperability or, at least, a degree of commonality in the presentation of information and the protocols employed. An alternative view is that the private sector can be relied upon to respond to demands of this nature by providing Value-Added Networks (VANs).

F. Intellectual property rights and the TRIPS Agreement

We mentioned in the previous chapter that two issues in the broad area of intellectual property rights are of great importance for the future development of electronic commerce; (i) the protection of copyrights and related rights, and (ii) the protection of trademarks and domain names. After elaborating on the relation between electronic commerce and intellectual property rights more generally, much emphasis will be put on discussing these two issues in detail.

The gradual shift towards high value-added, knowledge-based industries has made intellectual property an increasingly important issue in trade relations. This led to the inclusion of intellectual property in the Uruguay

Round negotiations, which resulted in the Agreement on Trade-Related Aspects of Intellectual Property Rights or TRIPS Agreement (see Box 11).⁴⁷ As a result of the TRIPS Agreement, the protection of intellectual property has become an integral part of the multilateral trading system, as embodied in the WTO.

A large share of Internet-based electronic commerce involves products protected by intellectual property rights, and intellectual property rights play an important role in the development of infrastructure and access-related equipment

The expected growth of electronic commerce is closely linked with the growing importance of intellectual property. Indeed, much of the trade on the Internet and other electronic communications networks involves selling or licensing of information, cultural products and technology protected by intellectual property. Selling books has become one of the most popular forms of commerce on the Internet, and selling other products such as sound recordings is growing. While many books, CDs or films ordered over the Internet are still delivered by mail, the Internet is increasingly used also as a means of delivering products to customers. This is common as regards news, articles and other commercial and technological information, and a growing share of computer software is sold this way. Once the capacity of the networks and end-users' equipment allows, communications networks will increasingly provide a vehicle to deliver products such as sound recordings and films directly to homes.

While this study mainly deals with issues concerning trade on electronic communications networks, it should be noted that intellectual property plays an important role also in promoting the development of the infrastructure of such networks, i.e. software, hardware and other technology that make up information highways. It provides protection to the results of investment in the development of new information and communications technology, thus giving the incentive and the means to finance research and development aimed at improving such technology. In addition, a functioning intellectual property regime facilitates transfer of information and communications technology in the form of foreign direct investment, joint ventures and licensing. The TRIPS provisions on intellectual property are designed to contribute to the promotion of technological innovation and to the transfer and dissemination of technology to the mutual advantage of producers and users of technological knowledge.⁴⁸

⁴⁷The text of the Agreement is available on the WTO website at <http://www.wto.org>, which also contains other information on the Agreement and the work of the Council for TRIPS. The website provides access to the Documents on-line database, which contains unrestricted and derestricted (i.e. public) WTO documents, including documents of the Council for TRIPS.

⁴⁸See Article 7 of the TRIPS Agreement.

Box 11: The TRIPS Agreement

The Agreement on Trade-Related Aspects of Intellectual Property Rights (the “TRIPS Agreement”) is Annex 1C of the Marrakesh Agreement Establishing the World Trade Organization (the “WTO Agreement”) of 15 April 1994, which entered into force on 1 January 1995. The Agreement aims to ensure the adequate protection and effective enforcement of intellectual property rights and the impartial resolution of disputes between WTO Members about such matters, to the mutual advantage of both producers and users of intellectual property.

The areas of intellectual property that the TRIPS Agreement covers are: copyright and related rights (i.e. the rights of performers, producers of sound recordings and broadcasting organizations); trademarks including service marks; geographical indications; industrial designs; patents, including the protection of new varieties of plants; the layout-designs of integrated circuits; and undisclosed information, including trade secrets and test data.

In respect of each of these areas of intellectual property, the Agreement sets out the minimum standards of protection to be provided by each Member. Each of the main elements of protection is defined, namely the subject-matter to be protected, the rights to be conferred and permissible exceptions to those rights, and the minimum duration of protection. The standards build on those in the main pre-existing WIPO Conventions, the substantive provisions of which are incorporated into the Agreement by reference.

The second main set of provisions in the Agreement lays down requirements for national procedures and remedies for the enforcement of these intellectual property rights (IPRs): general principles applicable to all IPR enforcement procedures; civil and administrative procedures and remedies; provisional measures; special border enforcement measures; and criminal procedures. These procedures and remedies must enable right holders to enforce their rights effectively and also provide for safeguards against their abuse as barriers to legitimate trade.

The Agreement makes disputes between WTO Members about the respect of TRIPS obligations subject to the WTO’s integrated dispute settlement procedures.

In addition, the Agreement provides for certain basic principles, such as national and most-favoured-nation treatment, and some general rules to ensure that procedural difficulties in acquiring or maintaining IPRs do not nullify the substantive benefits that should flow from the Agreement.

The TRIPS Agreement is an integral part of the WTO Agreement, and it is binding on each Member of the WTO from the date the WTO Agreement becomes effective for it. However, the TRIPS Agreement gives Members transitional periods, which differ according to their stages of development, to bring themselves into compliance with its rules. For developed countries, the general transitional period expired on 1 January 1996; for developing countries it lasts until 1 January 2000; and for least-developed countries until 1 January 2006. A country whose economy is in transition, but which is not a developing country, may nonetheless delay application until the year 2000, if it meets certain additional conditions. All Members have had to comply with the national and most-favoured-nation treatment obligation as of 1 January 1996. Special transition rules apply in the situation where a developing country does not presently provide product patent protection in a given area of technology, especially to pharmaceutical or agricultural chemical inventions.

The Agreement is administered by the Council for TRIPS, open to all Members, which reports to the WTO General Council.

Electronic commerce and the Internet will affect the way intellectual property rights are administered

Information and communications technology will affect the way intellectual property is administered and managed. It is increasingly used to improve the efficiency of, and cooperation between, national, regional and international intellectual property offices (patent and trademark offices). This will benefit the clients of these offices in the form of better and faster services, including shorter periods in acquiring intellectual property rights and better access to industrial property information.⁴⁹ One of the basic objectives of the patent system is to facilitate the dissemination of technological knowledge. Communications networks can be used to facili-

tate access from anywhere in the world to the valuable and comprehensive technological information contained in patent documents. As regards copyright and related rights, collective management organizations have traditionally been among the first to utilize new information technologies in licensing the use of international repertoires of protected works and distributing revenues to numerous right holders in different countries. Communications technologies will enable collecting societies to improve the services they provide both to right holders and users of protected materials. Electronic copyright management systems may make individual licensing and distribution of revenue feasible in areas where the vast numbers of works, right holders and users have until now made collective arrangements necessary.

⁴⁹Some intellectual property offices already exchange information over the Internet. WIPO is currently studying the possibility of establishing a global network that would link intellectual property offices for purposes of data exchange and cooperation.

A timely and effective implementation of the TRIPS Agreement is important for the future development of electronic commerce, with key challenges arising from the borderless nature of the Internet

The basic notions and principles of intellectual property have survived over a century of rapid economic, social and technological change. The traditional objectives of the system as reflected in the current international norms are valid even in "cyberspace". Therefore, timely and effective implementation of the TRIPS Agreement facilitates the development of electronic commerce and the necessary infrastructure. On the other hand, technological and economic developments have often prompted adjustments to existing types of intellectual property rights, and the creation of new types of rights, as well as giving rise to new problems of enforcement. In the same way the development of global electronic networks has raised new types of issues that may need to be addressed at the national and/or international level. The following discusses some of these issues that have been raised in the areas of copyright and related rights, and trademarks. The list of issues referred to is not intended to be exhaustive, and new problems are likely to emerge as more experience is gained with trade over communications networks.

Among the issues that have arisen are the problems that concern the difficulties in determining the applicable law in certain situations. While the following discussion is limited to copyright and related rights, and trademarks, it should be borne in mind that these problems reflect a more general legal question that relates to the "borderless" nature of the Internet, and to the difficulty of determining the applicability of territorially based laws and regulations to activities carried out on a global network. Finding workable solutions to these issues in the area of intellectual property, as well as in other areas, will require increased cooperation among governments and within the private sector.

Also, the distribution of products protected by copyright, trademarks or other intellectual property rights is often conducted by the right holder, including through licences, on a territorial basis. Such distribution and licensing arrangements are supported in many jurisdictions by laws on the exhaustion of distribution rights which enable right holders to prevent parallel importation of protected products put on the market in other countries.⁵⁰ While consumers have already been able to order goods from other countries by means of mail, telefax or telephone, the global electronic market place will considerably increase such commerce. Traditional delivery by mail of products directly to consumers across bor-

ders already has implications for territorially based distribution and licensing arrangements. When the delivery takes place over the Internet, products no longer cross borders in the traditional sense.

The future development of electronic sales and the distribution of copyrighted material depends on the respect of copyrights

Digital technology has already fundamentally changed the way that protected materials are created, produced and used. It has also led to the emergence of new types of products, notably computer programs and databases. The Internet and other electronic networks now provide a new means for the distribution of protected materials. However, as we note above (Section V.B), secure conditions for such distribution are a precondition for these new possibilities to be fully exploited. Copyright owners will be reluctant to put their protected materials on the net as long as they fear that the Internet will lead to uncontrolled dissemination and copying of phonograms, films, computer programs and other protected materials, which will seriously undermine copyright industries. Also service providers and others involved in the process of making materials available to end users will need clear rules to be able to plan how to develop their services.

The TRIPS Agreement and the new WIPO copyright treaties protect copyrights also for electronic transactions

The TRIPS Agreement obliges WTO Members to comply with the substantive obligations of the Paris Act of 1971 of the Berne Convention for the Protection of Literary and Artistic Works (Berne Convention).⁵¹ The traditional principles of international copyright law as contained in the Berne Convention, originally concluded in 1886 and updated through periodic revisions, have proven to be sufficiently flexible to have been able to accommodate new categories of works, and ways of creating and using protected materials in the digital environment. The right of reproduction, provided under the Berne Convention and incorporated by reference into the TRIPS Agreement, continues to be a central element of protection even in the digital environment. The TRIPS Agreement reinforces the application of that and other rights contained in the Berne Convention through more effective enforcement, monitoring of compliance with the obligations, and application of the dispute settlement mechanism. In addition to requiring compliance with the basic standards of the Berne Convention, the TRIPS Agreement clarifies or adds certain specific points. As re-

⁵⁰Article 6 of the TRIPS Agreement provides that for the purposes of dispute settlement nothing in the Agreement shall be used to address the issue of the exhaustion of intellectual property rights, provided that the national treatment and most-favoured-nation treatment obligations are complied with.

⁵¹The text of the Berne Convention and other treaties administered by WIPO can be found on the WIPO website at <http://www.wipo.int>, which contains also other information on WIPO and intellectual property.

Box 12: Online Communications and the New WIPO Treaties

The main improvements to the existing level of protection of authors', performers' and phonogram producers' rights in the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty that relate to the use of works on the Internet concern the right of communication, circumvention of technological measures and integrity of rights management information.

Authors, performers and phonogram producers enjoy an exclusive right of authorizing the communication or making available to the public of their protected material, by wire or wireless means, in such a way that members of the public may access it from a place and at a time individually chosen by them. These rights cover, for example, on-demand delivery of works over the Internet (Article 8 of the WIPO Copyright Treaty, and Articles 10 and 14 of the WIPO Performances and Phonograms Treaty).

The treaties recognize the role that technological measures used by right holders have in facilitating effective protection. Various technologies exist, or are being developed, that, for example, incorporate into a digital copy of a work information designed to control access to or limit copying of that work. In order to ensure the effectiveness of such measures, contracting parties to the treaties must provide adequate legal protection and effective legal remedies against the circumvention of effective technological measures that are used by authors, performers or producers of phonograms in connection with the exercise of their rights, and that restrict acts, in respect of their protected material, which are not authorized by right holders concerned or permitted by law (Article 11 of the WIPO Copyright Treaty and Article 18 of the WIPO Performances and Phonograms Treaty).

Individual licensing and collective management of protected materials on the Internet can be facilitated by electronic rights management information that can be attached to digital copies of works and other material. The latest technologies include digital envelopes and watermarks which allow a right holder to incorporate into a copy of a work information which, for example, identifies the work, its author and any other right holders in the work, or determines the terms and conditions of use of the work. The treaties require contracting parties to provide adequate and effective legal remedies against any person, who, without authority, removes or alters such information or distributes copies of protected material knowing that such information has been removed or altered without authority, and knows or, with respect to civil remedies, has reasonable grounds to know that it will induce, enable, facilitate or conceal an infringement of any right covered by the treaties (Article 12 of the WIPO Copyright Treaty and Article 19 of the WIPO Performances and Phonograms Treaty).

gards digital technology, it confirms that computer programs, whether in source or object code, must be protected as literary works, and clarifies that databases and other compilations of data or other material must be protected as such under copyright even where the databases include data that as such are not protected under copyright.

Two important new treaties on copyright matters were adopted under the auspices of the World Intellectual Property Organization (WIPO) in December 1996, namely the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty. The treaties enter into force three months after 30 instruments of ratification or accession by states have been deposited with the Director General of WIPO.⁵² These new instruments are self-standing treaties, which build on the Berne Convention and the TRIPS Agreement, but in some respects go further. The main improvements that relate to the use of works and phonograms on the Internet and other communications networks concern the right of communication, circumvention of technological measures and integrity of rights management information (see Box

12 for a more detailed discussion of these concepts). The implementation of these new treaties will greatly facilitate the creation of a secure and predictable legal environment that will foster the development of electronic commerce involving online distribution of protected materials.⁵³

Both the TRIPS Agreement and the WIPO Copyright Treaty recognize that copyright protection covers compilations of data or other material, which by reason of the selection or arrangement of their contents constitute intellectual creations. In the course of the preparation of the Diplomatic Conference that adopted the aforementioned new WIPO treaties, it was discussed whether there is a need to supplement this by providing additional protection to economically valuable elements of databases that require the investment of considerable human, technical and financial resources but may not benefit from copyright protection. While the Conference did not take any action on the draft treaty on this matter submitted for its consideration,⁵⁴ the delegations participating in the Conference recognized that databases are a vital element in the development of a global information infrastructure,

⁵²The texts of the treaties can be found on the WIPO website at <http://www.wipo.int>, which also contains the documents of the Diplomatic Conference on Certain Copyright and Neighbouring Rights Questions, held in Geneva from 2 to 20 December 1996, and a list of signatories and ratifications of the treaties.

⁵³Certain issues were not addressed in the treaties but were left to be determined at the national level. These include the issues of online service provider liability and the scope of the reproduction right, i.e. whether transient reproductions that are produced when protected material is communicated over the Internet are covered by that right. These two issues relate to the more general question of which law(s) should apply to the use of protected material on the Internet. The "borderless" nature of the Internet may also make it difficult to determine the "country of origin" of works first published in an electronic form. Draft Article 3 of the Basic Proposal for the Substantive Provisions of the Treaty on Certain Questions concerning the Protection of Literary and Artistic Works to be considered by the Diplomatic Conference (WIPO document CRNR/DC/4) contained a clarification in this respect, but the provision was not included in the final text of the WIPO Copyright Treaty.

⁵⁴See the Basic Proposal for the Substantive Provisions of the Treaty on Intellectual Property in Respect of Databases to be considered by the Diplomatic Conference (WIPO document CRNR/DC/6), which provided the maker of a database the right to authorize or prohibit the extraction or utilization of all or a substantial part of the contents of a database (see draft Articles 2 and 3 of the Proposal).

and expressed their interest in examining further the possible implications and benefits of a sui generis system of protection of databases at the international level.⁵⁵ This examination is underway under the auspices of WIPO.

When discussing the impact of digital technology on copyright and related rights, we should not lose sight of the fact that the most immediate risk faced by copyright industries is the production and distribution through traditional means of pirated sound recordings, films, software, CD-ROMs, etc. Such products have become increasingly vulnerable to piracy, given the ease and diminishing costs of digital copying, and the fact that digital information can be copied over and over again without any loss of quality. In this respect, the TRIPS Agreement aims to ensure that effective means are available to right holders to enforce their intellectual property rights. The Agreement also provides for rental rights in respect of computer programs and phonograms, and in certain situations, cinematographic works, given that uncontrolled rental of such works, whether in digital or analogue form, may lead to widespread unauthorized copying. In addition, WTO Members have agreed to cooperate with each other with a view to eliminating international trade in goods infringing intellectual property rights. Experience in the fight against traditional forms of piracy, and increased cooperation between agencies responsible for enforcement, will also help to prepare for action against possible new forms of online piracy.

Despite challenges, electronic commerce and the Internet open great new opportunities for consumers and producers of copyrighted products

While we should not underestimate the challenges posed by global communications networks to the regulation and enforcement of copyright and related rights, we should bear in mind the great new opportunities such networks provide. For consumers, the Internet may give wider choice of information and cultural products irrespective of their place of residence, and for authors, publishers and producers, it may lower the costs of and barriers to entering the global market. Transaction costs and transaction times are likely to fall rapidly. However, this positive scenario requires that governments and the private sector are able to find and implement a proper mixture of regulatory, contractual and technological measures, and to improve public awareness of the role of copyright and related rights in the information society.

The TRIPS Agreement protects trademarks and other distinctive signs which allows consumers to make more informed choices

Protection of trademarks and other distinctive signs aims to stimulate and ensure fair competition between producers and to protect consumers by enabling them to make informed choices between various goods and services. In electronic commerce, brand recognition is essential for suppliers of goods and services. For consumers who buy products at a distance, it may be increasingly necessary to rely on the reputation attached to trademarks and other distinctive signs, as they do not have an opportunity to establish a personal contact with the seller of those products, or to inspect the products before buying them.

The TRIPS Agreement provides that any sign, or any combination of signs, capable of distinguishing the goods and services of one undertaking from those of other undertakings, must be capable of constituting a trademark. In order to obtain protection, a company generally registers a trademark in each country in which it operates.⁵⁶ Registration is made in respect of specified goods or services. The owner of a registered trademark has an exclusive right to prevent others from using in the course of trade identical or similar signs for goods or services which are identical or similar to those in respect of which the trademark is registered, if such use would result in a likelihood of confusion. The Agreement contains additional obligations in respect of well-known marks: the registration of a mark must be refused or cancelled, and its use must be prohibited, if it conflicts with a well-known mark.

The use of trademarks on the Internet poses a number of challenges, especially in relation to Internet domain names

The use of trademarks on the Internet raises a number of questions. Under what circumstances and in which jurisdiction(s) does such use of a mark constitute an infringement of a registered trademark? If the use is considered to constitute an infringement in one country, what remedies should be available, in particular if the transmission originates in another country? Under national laws, use of a trademark may be a condition for registration, or for maintenance of registration; does the use of a trademark on the Internet satisfy such requirements, and if so, in which countries? Identical or similar trademarks may be owned by different persons in dif-

⁵⁵See the Recommendation concerning Databases, adopted by the Diplomatic Conference on 20 December 1996 (WIPO CRNR/DC/100).

⁵⁶It is possible to obtain protection for trademarks in more than one country through certain regional trademark offices. The Madrid Agreement Concerning the International Registration of Marks provides for the international application of registration of trademarks at the International Bureau of WIPO.

ferent countries; the use of such trademarks on the Internet by one or more of the right owners may lead to conflicts. Is the current territorially-based system of registration of trademarks sufficient for the emerging borderless electronic marketplace?

A specific issue that has received much attention concerns the relationship between trademarks and Internet domain names.⁵⁷ Some of the problems stem from the fact that under each top-level domain name there can be only one of each particular second-level domain name, which are usually allocated on a first-come, first-served basis within each top-level domain name. On the other hand, the same trademarks may co-exist in different categories of products or services, and in different territories. In addition, there have been problems such as “warehousing” of second-level domain names corresponding to well-known trademarks for the purpose of selling them to trademark owners. At the same time, easily memorable domain names have themselves become commercially valuable assets, akin to intellectual property. One of the questions that has arisen is under what circumstances and under which jurisdiction(s) the use of a domain name that is identical or similar to a trademark may constitute a trademark infringement, and what remedies should be available for the trademark holder. Further consideration is needed to determine whether the above mentioned problems call for adaptations to the international protection of trademarks.

Conflicts between trademarks and domain names have brought to the fore also the more general question, not limited to intellectual property, of how best to develop the governance of the domain name system. A Memorandum of Understanding on the Generic Top-Level Domain Name Space of the Internet Domain Name System (gTLD-MoU) was signed in Geneva on 1 May 1997. It embodies the conclusions of the Final Report of the International Ad Hoc Committee, which was convened by the Internet Society and the Internet Assigned Numbers Authority. The gTLD-MoU establishes a program for enhancing the existing gTLD system and creating a self-governing structure for the registration of SLDs under the new gTLDs. The policy is intended to provide a dispute resolution mechanism concerning registrations under the new gTLDs. Substantive rules for resolving conflicts between domain names and existing intellectu-

al property rights are envisaged as being part of the mechanism, responding to concerns about the adequacy and coherence of the present regionally based system of protecting intellectual property rights, in particular trademarks, for addressing conflicts in a global system of domain names. The International Bureau of WIPO and the Secretariat of the International Telecommunication Union (ITU) have participated in the preparation of this policy, under which the WIPO Arbitration and Mediation Center would administer dispute resolution procedures,⁵⁸ and the Secretary-General of the ITU would act as the depository of the gTLD-MoU.⁵⁹ Another plan to develop the governance of the domain name system is contained in a discussion draft entitled “A Proposal to Improve Technical Management of Internet Names and Addresses”, which was published by the United States Department of Commerce on 30 January 1998. The plan calls for the establishment of a private, not-for-profit corporation that would gradually take over certain responsibilities related to the governance of the Internet and the domain name system, and the creation of up to five new registries, each of which would be initially permitted to operate one new gTLD.⁶⁰

While the above discussion has focused on trademarks, it should be borne in mind that similar issues may arise in respect of other distinctive signs protected by intellectual property rights. As regards geographical indications, the TRIPS Agreement requires that interested parties must have the legal means to prevent the use of indications which mislead the public as to the geographical origin of the good, and use which constitutes an act of unfair competition. Additional protection is provided for geographical indications for wines and spirits. Other relevant categories of distinctive signs include state emblems and trade names.

G. Regulatory issues in the WTO

The need for regulation in some circumstances is beyond dispute — it is the design and administration of regulations that matters

A major challenge for the trading system is how to secure the legal framework for trade liberalization without infringing on the freedom of governments to pursue

⁵⁷Domain names are part of the Internet addressing system, which consists of two elements. Each computer has its Internet Protocol address, a numeric identifier that looks very much like a telephone number. These numeric identifiers are paired with domain names, user-friendly substitutes for numeric identifiers. A domain name typed into a computer is automatically converted into the corresponding numeric identifier. For example, the WTO's website can be found at <http://www.wto.org>. The prefix <http://www> indicates the protocol to be used and that the site is located on the World Wide Web. The domain name must have at least two parts: a top-level domain name (TLD), in this case “.org”, and a second-level domain name (SLD), in this example “wto”. Anyone from any country can register in the main generic TLDs (gTLDs, also called international TLDs), currently .com, .org, and .net. The most popular of them is .com, which is reserved for commercial entities. Two-letter country code TLDs, which use the ISO 3166 country codes (e.g. .ch for Switzerland), are reserved for entities in a given country.

⁵⁸Under the MoU, it is contemplated that the WIPO Arbitration and Mediation Center would administer three different dispute resolution procedures in connection with registrations of domain names covered by the gTLD-MoU: on-line mediation, on-line expedited arbitration, and on-line administrative challenge panel procedure. On-line mediation and on-line expedited arbitration would use the existing WIPO arbitration rules. The procedures to be followed in the on-line administrative challenge panel procedure would be defined in the WIPO Rules for Administrative Challenge Panel Procedures Concerning Internet Domain Names, and the criteria for resolving disputes in the Substantive Guidelines for Administrative Domain Name Challenge Panels. Both the procedural and substantive rules are still being finalized.

⁵⁹The text of the gTLD-MoU and related information can be found on the gTLD-MoU website at <http://gtld-mou.org>.

⁶⁰The proposal can be found on the United States National Telecommunication and Information Administration website at <http://www.ntia.doc.gov>.

legitimate domestic objectives. Typically, governments will seek to regulate on public policy grounds for any of three broad reasons. First, most governments assume a responsibility to protect consumers. Such protection might be called for in a number of different situations, ranging from relatively mild instances of consumer vulnerability in the face of a lack of information or misinformation, to more serious life- or health-threatening situations. Second, governments may regulate for overriding public interest or national security reasons. Third, regulation could be aimed at counteracting unsatisfactory market situations, typically where one or more suppliers possess monopolistic power.

Neither the GATT nor the GATS attempts to pronounce upon the legitimacy of regulatory objectives as such, as long as the objective is not the protection of domestic industry. Rather, the WTO's focus is upon how regulatory objectives are met, seeking to ensure that regulations do not serve as a surrogate means of discrimination or protection. A fundamental rule is that a regulatory intervention must be no more burdensome or trade-restrictive than necessary to attain its objective. The "least-trade-restrictive" rule is meant to ensure a light-handed approach to regulation. This is particularly important in the field of electronic commerce, where difficulty in identifying transactions can arise, perhaps tempting governments to adopt sweeping controls that inhibit legitimate transactions, or even transactions that are not in need of any regulation at all. In seeking a balance that ensures the least intrusive means of regulating, an important question is who should be responsible for whatever regulation is required. The role of government does not necessarily have to be that of front-line regulator. In many instances, self-regulation of one sort or another may be the solution. If there is a problem deriving from unequal access to information, which is often the case, the required intervention is simply the provision of information, and this requirement would not necessarily have to be met directly by government. It could be assigned to producers or dealt with through some arrangement involving a non-governmental entity. The final choice of whether to make a purchase would then be left in the hands of (now well-informed) consumers, and the government's role might amount to little more than providing recourse in the event that false information is supplied. In other cases, the government might mandate that certain information be made available to consumers, but take no part in providing the information. Or perhaps a government could provide a focal point where consumers can acquire information.

Whatever the precise nature of such arrangements, the point is that consumers, producers or suppliers may

serve as de facto or de jure regulatory agents for governments, whether in an information dissemination, licensing, certifying, or monitoring role, leaving only certain "hard-core" regulatory functions to be carried out by governments themselves. The balance between governmental and non-governmental regulatory responsibilities in a given jurisdiction would depend in part on the preparedness and technical capacity of non-governmental agencies or private sector entities. Moreover, in balancing the options, a useful distinction to be made is between determining the content of a regulation or standard, and responsibility for its implementation.

The GATS approach to regulation, modelled on GATT, emphasizes non-discrimination and "least-trade-restrictive" interventions

Before considering more closely some of the regulatory challenges posed by electronic commerce, it is useful to review the main provisions under the GATS which define the approach to regulations. Many services are heavily regulated. A variety of factors explain this. The nature of many services makes it necessary to apply regulations to suppliers - since consumers lack information about them - instead of focusing on their products, as can be more readily and perhaps less obtrusively done in the case of goods. Moreover, in some services markets, such as telecommunications, market dominance by one or a few firms has meant that regulation serves a role that markets would fulfil in more competitive situations. The GATS provides governments with considerable freedom in this regard. But, as noted earlier, the GATS, like the GATT, seeks to protect trade interests without attempting to determine the legitimacy of regulatory objectives.

Four key provisions shape the GATS approach to regulation. First, Article XIV (crafted similarly to GATT Article XX) permits Members to take measures, in specified circumstances, that would otherwise violate GATS obligations. The reasons for taking such measures include: the protection of public morals, and of human, animal or plant life or health; the maintenance of public order; ensuring compliance with laws and regulations, including those dealing with the prevention of deceptive and fraudulent practices, the non-fulfilment of contracts, the protection of privacy and confidentiality, and safety; and, finally, enforcement of national fiscal systems. Article XIV states that such measures must not be applied in a manner that constitutes "a means of arbitrary or unjustifiable discrimination between countries where like conditions prevail, or a disguised restriction on trade in services".⁶¹ In the context of electronic commerce, Article XIV would

⁶¹Article XIV bis, like GATT Article XXI, deals with security exceptions. It allows Members to withhold information or take any action pursuant to their essential security interests relating to the provision of services to military establishments, to fissionable and fusionable material, or to measures taken in time of war or other emergency in international relations. Members are also allowed to take measures that would otherwise be GATS-inconsistent in order to comply with their obligations under the United Nations Charter for the maintenance of international peace and security.

provide any necessary legal cover for measures required to deal with such questions as the protection of privacy on the Internet.

Second, Article II of GATS contains the most-favoured-nation (MFN) principle, which requires each Member to “accord immediately and unconditionally to services and service suppliers of any other Member treatment no less favourable than that it accords to like services and service suppliers from any other country.” As mentioned above, time-limited exceptions to this principle could be inscribed by Members upon the entry into force of the GATS.⁶²

Third, Article XVII embodies the National Treatment principle, whereby a Member must “accord to services and service suppliers of any other Member, in respect of all measures affecting the supply of services, treatment no less favourable than that it accords to its own like services and service suppliers.” The national treatment obligation only applies under the GATS when a service has been scheduled. The application of national treatment to scheduled services may also be conditioned by limitations inscribed in the schedule. In so far as regulations may be regarded as measures affecting trade in services, commitments to provide national treatment guarantee foreign suppliers non-discriminatory conditions of competition.

Fourth, Article VI of the GATS defines a number of other disciplines regarding the application of regulations. Article VI stipulates that where specific commitments have been undertaken, all “measures of general application” affecting trade in services (for instance, licensing or qualification requirements for all service providers, domestic and foreign) must be administered in a reasonable, objective and impartial manner. Paragraph 4 of Article VI calls for a work programme to develop any necessary disciplines to ensure that “measures relating to qualification requirements and procedures, technical standards and licensing requirements do not constitute unnecessary barriers to trade in services.” Pending the development of such disciplines, Article VI:5 requires that regulatory measures are based on objective and transparent criteria, that they are not more burdensome than necessary to ensure the quality of a service, and that in the case of licensing, the procedures do not themselves constitute a restriction on the supply of the service.⁶³ These disciplines must be respected in relation to all scheduled commitments unless such treatment could not reasonably have been expected at the time that specific commitments were made in a given sector.

The nature of electronic commerce may influence the manner in which governments seek to meet their regulatory objectives, if not the objectives themselves

Bearing in mind the existing GATS legal framework, it may be useful to consider briefly how the approach to regulation might be influenced by the nature of electronic commerce.⁶⁴ A three-fold categorization of regulatory interventions may be helpful in this regard. First, governments might agree to common regulatory objectives, especially where the activity concerned is universally regarded as egregious. Examples of such activities might include the dissemination of child pornography, bomb-making instructions, or money laundering. If governments can all agree that these are unacceptable activities, then it is relatively straightforward to see how cooperative enforcement might be arranged. Jurisdictional difficulties would generally not arise.

The second category of regulatory interventions involves activities that individual governments wish to prohibit, but in respect of which no consensus as to standards exists. Certain pornography and various kinds of advertising would be examples of activities falling into this category. In this case, a government wishing to prevent something from happening has either to rely exclusively on its own jurisdictional authority, or else seek cooperation from other jurisdictions. Activities falling into both the first and second categories may, in GATS terms, be addressed under Article XIV or XIV bis. However, complications might arise from an enforcement and monitoring perspective in this case because of the multi-jurisdictional nature of the transactions. For instance, a transaction might originate in a country where such activities are allowed and be delivered to a country where they are not allowed.

The third category comprises activities where regulation may be called for, but where there is no desire on the part of a government to impose a prohibition. Rather, the concern is with setting preconditions for participating in the market, such as qualification requirements and procedures, technical standards and licensing requirements, which are in the domain of GATS Article VI. The regulatory objective of these measures would generally be to ensure that service suppliers are adequately equipped to supply the services they offer and that the quality of services supplied attains an adequate standard. Governments might, for example, wish to ensure that foreign doctors providing cross-border medical services over the Internet were adequately qualified. The issue in this type of regulatory situation is often the pro-

⁶²The possibility of taking MFN exemptions has been extended in certain cases, where sectoral negotiations have continued after the completion of the Uruguay Round. But the essential principle remains - that of permitting MFN exemptions only at the time of the entry into force of the WTO Agreement.

⁶³Article VI:4 makes it clear that these disciplines are the starting point for the development of any additional or more detailed disciplines later on.

⁶⁴The earlier discussion of problems of overlap in relation to mode 1 and mode 2 transactions is also relevant in the present context, to the extent that jurisdictional questions may turn on a determination of the mode of supply involved in a transaction.

vision of adequate information to protect consumers, and as noted above, this may open up possibilities for indirect involvement on the part of governments and a role for suppliers and/or consumers. As with the first two categories, the nature of services and the manner of their delivery can raise problems of enforcement and monitoring in this area as well.

Given the advantages offered by electronic commerce, governments may decide in some instances to trade off a degree of regulatory certainty in exchange for efficient and unencumbered trade. Such flexibility would be more likely to receive favourable consideration in the case of category-three activities described above, rather than in the case of the first two categories. The willingness of governments to move in this direction would obviously depend on a judgement as to the necessity of particular regulations. One way of lightening the regulatory burden would be to change regulatory requirements themselves. Another would be to delegate regulatory functions to those that would fulfil them in the least intrusive manner, such as consumers or suppliers, while reserving to government a broad supervisory role. It would not necessarily be the case that the delegation of regulatory functions to producers, suppliers or consumers would imply lesser regulation in terms of vigilance and certainty. Depending on the arrangements made, and the capacity of non-governmental agencies and entities to carry out regulatory functions or to self-regulate, the result could in fact be more certainty with less intervention.

Electronic commerce raises some jurisdictional questions regarding regulation that will influence the nature and content of inter-governmental cooperation.

Taking the three-fold distinction above between universally prohibited activities, nationally prohibited activities, and nationally controlled or supervised activities, it may be worthwhile to consider further some jurisdictional issues relating to electronic commerce. It should be emphasized that the present discussion focuses only on transactions that are completed electronically, or in other words, on products that are delivered across a frontier digitally through the Internet or some comparable medium. Included here, but not for separate discussion in this context, are products delivered across borders which are subsequently converted into alternative formats, such as digitally transmitted texts that are turned into bound books, or digitally transmitted sound or image recordings that are subsequently given the physical form of CDs or videos. For present purposes, we are referring to these two types of products together, both of which involve cross-border delivery, and distinguishing them from that range of electronic transactions which leads to separate delivery of a final product other than by electronic means, for example via parcel post. For the latter type of transaction, where a good crosses the fron-

tier, the regulatory or standards-related issues which arise are not new, and fall within the purview of GATT and the Agreement on Technical Barriers to Trade. Nor are all the Internet-related jurisdictional issues we mention here new, since they have arisen for a long time with respect to earlier forms of electronic commerce via telephone and fax.

Broadly speaking, regulatory objectives could be implemented at the source of supply, in the jurisdiction from which the products concerned emanate, or in the jurisdiction where consumption occurs. However, in the particular case of mode 2 in GATS — consumption abroad — supply and consumption may take place in the same jurisdiction. Where this is the case, it may be thought that it is straightforward for the supplier's regulatory regime to apply, regardless of the fact that the consumer is from another jurisdiction. In the case of electronic commerce, however, consumption abroad is unlikely to mean that the consumer has physically changed jurisdictions, but rather that a consumer physically located in one jurisdiction is consuming services across the Internet that are supplied in another jurisdiction.

It has been argued in the case of financial services, for example, that the simplest regulatory approach would be to agree that the suppliers' jurisdiction would assume regulatory responsibility for any transaction, provided that governments cooperate to ensure that all necessary information is provided to consumers (Lascelles, 1997). A contrary view is that Internet service providers in the jurisdiction of the consumer should be charged with the responsibility of policing transactions in financial services taking place over their networks.

These contrasting approaches raise a fundamental question as to the willingness of governments to allow each other to regulate cross-border electronic transactions affecting their consumers. Attitudes are likely to vary, both among governments and according to the nature of the activity concerned. Where the mode 2 approach is adopted — that is, where the suppliers' jurisdiction takes regulatory responsibilities for all transactions — there might be advantages to suppliers and consumers in terms of the costs and simplicity of regulatory compliance. But mutual recognition is implicit in this approach, with respect to all three types of content regulations. It means that as far as these kinds of cross-border transactions are concerned, and assuming regulatory harmonization has not occurred, consumers will be permitted to choose in which jurisdiction to do business in part as a function of regulatory conditions. As already noted, even if this approach were to be found acceptable — and arguably it is in practice the "default" outcome where governments have not sought to regulate or police electronic commerce of foreign provenance directly in their own jurisdictions — there is still a role for international cooperation in relation to the supply of information.

If governments are unwilling to accept foreign regulatory authority in this fashion, the question arises of how to secure effectively cross-border regulatory supervision and monitoring. In effect, similar issues relating to the exercise of regulatory authority in the field of electronic commerce may arise whether or not transactions take place across jurisdictions. The idea of charging Internet service providers with a regulatory role may be one option. Certain legal liability issues would no doubt arise in this case, as well, perhaps, as technical complications. Legal questions would involve such matters as the responsibilities of Internet service providers in relation to the regulatory authority, and consumer protection issues in regard to commercial confidentiality and privacy. There is bound to be a trade-off here, where for example, encryption techniques are designed precisely to make it more difficult for anyone to gain access to information, while regulators might at the same time be seeking to facilitate such access. Complications at the technical level from passing responsibility for content control to Internet service providers might be mitigated to the extent that technologies involving the information coding of transmissions, digital identifiers and digital signatures might be developed.⁶⁵

If technologies to control transactions become widely available, there would presumably be a range of services for which regulatory intervention could be limited to ensuring that rules regarding information content are observed. With such rules in place, there could also be a significant role for "self-policing" by Internet service providers, by the suppliers of content and by consumers. On the other hand, new technologies may make effective monitoring of regulations even more difficult than it is already, regardless of the chosen laws of regulatory responsibility. Certain new satellite-based telecommunication services dispense entirely with reliance on local networks, making electronic commerce even more "borderless".

What of the situation in which governments do not want to cede regulatory authority to other jurisdictions and do not want to treat such transactions as if they

were of the GATS mode 2 variety, but at the same time recognize the practical difficulty that they face in making their regulations effective because of the nature of electronic commerce? In such circumstances, one approach would be to try to make foreign suppliers legally answerable in the consumer's jurisdiction, regardless of the fact that the supplier is located in another jurisdiction. This approach was discussed in Section V.D above in relation to taxation issues. A possible drawback with this approach is that it could severely inhibit the geographical spread of electronic commerce, as it would imply the establishment of some kind of "commercial presence" in any jurisdiction with which business was transacted.

Another approach would be to confer "agency" status on foreign regulators or suppliers. Under this kind of arrangement, a regulatory authority would be able to insist on its own standards or regulations, but could rely on foreign agents to implement them. Such arrangements could prove difficult to design and implement, and they would certainly raise some complications as to legal liability on both the production and consumption sides. A precedent of sorts for considering this type of arrangement was discussed in GATT in the 1980s. The subject was the prohibition of exports of goods to developing countries, whose consumption was prohibited domestically in developed countries. The concern was that developing countries were treated as "dumping grounds" for sub-standard and sometimes dangerous products as they did not have the administrative machinery to prevent importation.

Various proposals were made on how to deal with the problem. One proposal was that the authorities in developed countries would take responsibility for preventing the exportation of these products. The idea did not prosper for several reasons, not least among them the fact that no agreement existed as to which products such a prohibition should cover. Nevertheless, it is perhaps not impossible to imagine an approach like this working in other circumstances, particularly with private sector involvement.

⁶⁵See Section V for a brief discussion on technical options to control content.

VII. Conclusion

In this study we have argued that electronic commerce, especially via more recently developed instruments such as the Internet, is likely to result in many valuable new opportunities for beneficial economic transactions and international trade, and, ultimately, for people to better their lives. Lower information and communication costs, and easier market access and competition, are likely to result in more diversity, higher quality and/or lower prices for various electronically traded goods and services. As a result, rapid growth can be expected in electronic commerce in the future. Many sectors, especially in services and electronically delivered goods, will experience important changes in the way that business is conducted and strong growth in output and employment.

However, a number of sensitivities and concerns regarding electronic commerce must be addressed. The handling of these challenges will determine how much of the growth potential in electronic commerce will actually materialize and how the benefits will be distributed. Creating an appropriate environment requires a focus upon: (i) securing adequate telecommunication infrastructure and standards; (ii) promoting access to this infrastructure; (iii) providing legal and jurisdictional predictability; (iv) ensuring security and privacy of information; (v) designing appropriate regulation and tax regimes; and (vi) fostering equal opportunity through ap-

propriate policies to promote education and access, particularly in developing countries. The role of the WTO, within its areas of competence, is to foster an environment conducive to international electronic transactions. Liberalization of the telecommunication and information technology sectors will help to provide infrastructure access at low cost to a rapidly increasing number of suppliers and users, thereby spreading the potential benefits from electronic commerce to rich and poor alike. Commitments on service trade liberalization make a valuable contribution to the development of electronic commerce. The benefits from trade liberalization commitments can be further magnified by the use of the Internet for easier and more competitive public procurement and for trade and customs administration. The protection and proper management of intellectual property rights is critical for future electronic commerce. Finally, least-trade-distortive regulation and liberal market access would also help in reaping the full benefits from lower costs and more competition.

The nature of policy interventions chosen to address these matters and the degree of successful cooperation among governments in defining appropriate solutions to policy challenges will be key in determining the level of benefits that electronic commerce will bring. The basic objective is to secure the maximum benefits for all without compromising legitimate public policy aims.

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