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Electronic Commerce and Developing Countries

THE INTERNET IS GLOBALIZATION ON STEROIDS. It will boost efficiency and enhance market integration domestically and internationally, particularly in developing countries that are most disadvantaged by poor access to information. Although the Internet should enhance global growth, it also brings increased danger of economic marginalization to countries that cannot access it effectively. Taking advantage of electronic commerce requires policies similar to those needed to capitalize on the opportunities for trade: improved international coordination, for example in ensuring interoperability of communications technology and confronting challenges to domestic tax and financial systems; an open economy promoting competition and diffusion of Internet technologies; and efficient social and infrastructure services, in particular a competitive telecommunications sector and a well-educated labor force.

Despite the obvious benefits of the Internet, uncertainty exists about the implications of this technology and its likely rate of diffusion. This chapter provides a tentative view of the implications of electronic commerce for developing countries, based on the theoretical literature, inferences from experience in industrial countries, and anecdotal evidence. The discussion is inevitably somewhat more speculative than in other chapters. The evidence, however, warrants four broad conclusions:

Firms in developing countries should enjoy productivity gains and expanded demand with the spread of electronic commerce.

The Internet will boost productivity in developing countries by increasing the efficiency of the procurement system, strengthening inventory control, lowering retail transaction costs, and eliminating or transforming intermediaries. Virtual proximity to industrial country markets will increase as the Internet reduces the costs inherent in operating at a distance. Given the wide differences in returns to factors in developing versus industrial countries, this increased proximity will generate large gains from trade in sectors that lend themselves to electronic commerce.

Consumers will benefit from increased competition and market transparency, but the benefits to firms will vary greatly, depending on the sector, degree of product differentiation, and level of technological sophistication.

Developing country firms that sell labor-intensive, differentiated products (such as crafts, software, or business services—particularly services involving the remote processing of routine information) will experience increased demand. These firms also will benefit from the opportunity to leapfrog to the most advanced technologies and from easier access to advertising on global markets.

The impact of electronic commerce on developing countries' sales to global supply chains is uncertain. Reduced transactions costs should provide greater interaction among multinationals and technologically sophisticated firms in developing countries. Many developing-country firms may lack the reputation required

to bid on the newly created online exchanges, however. Industrial-country multinationals also may prefer integrating their operations more closely with a reduced number of the most advanced firms, given the opportunities for managing tightly linked production processes through the Internet.

Government action is critical to removing impediments to electronic commerce.

Network externalities imply that market prices may not fully reflect the gains to the society from increased levels of Internet access; hence the government has a role in speeding Internet diffusion. Complementary inputs, including telecommunications, transport and power infrastructure, and a well-educated labor force are critical to exploiting the Internet's potential. Governments have also encouraged the expansion of the Internet by subsidizing Internet connections and investing directly in infrastructure, although such investments can crowd out private initiatives and may quickly become obsolete due to rapid changes in technology.

Other policies can also contribute to boosting Internet use. An open foreign direct investment regime is necessary to promote dissemination of information technology and training. Governments can help facilitate services that evaluate and attest to the quality of output from domestic firms, which could support their access to global Internet exchanges. Governments must provide a supportive legal framework for electronic transactions, such as recognition of digital signatures and legal admissibility of electronic documentation. Governments can also encourage Internet expansion by moving procurement and administrative requirements (tax forms and permits, for example) online. Finally, it is desirable to avoid high levels of taxation on critical inputs to electronic commerce such as personal computers and telecommunications equipment.

The gap in Internet access between industrial and developing countries will persist through the next decade.

Access to the Internet is grossly unequal, with 30 percent of the U.S. population online compared with an average of 0.6 percent in

developing countries. Access, supported by the growing use of cell phones as a major link to the Internet, is expected to rise at a faster rate in developing countries than in industrial countries during the next 10 years. Internet access is likely, nonetheless, to remain limited in per capita terms, especially in the poorest countries, and to remain well below levels already achieved in industrial countries. Access by firms in developing countries may increase significantly, but the poorest developing countries may still see their competitiveness impaired because of a lack of human capital and complementary services required for effective participation in electronic commerce.

Emergence of electronic commerce

Transacting business using electronic aids is as old as the telegraph, which was introduced in the mid-nineteenth century. More recently, electronic data interchange (EDI) systems not residing on the Internet have facilitated business transactions worth trillions of dollars. This chapter, however, explores how the relatively new phenomenon of the Internet is likely to affect commerce. Several definitions of electronic commerce exist, including transactions where the Internet is used to gather information, to order goods or services, and to make payments. A reasonable definition of electronic commerce would include commercial operations in which two of these three steps are taken electronically.¹

Although the chapter focuses on electronic commerce (in keeping with the overall theme on trade), this is by no means the only, or necessarily the most important, way the Internet will affect developing countries. Increased access to information holds enormous promise for bettering noncommercial aspects of the lives of people in the developing world—providing health and education services from a distance, and more efficient government administration are but two examples. At the same time, the growth of the Internet will increase the exposure of developing countries to material, such as pornography, that may be viewed as undesirable.

Electronic commerce in industrial countries has grown rapidly, from next to nothing in the mid-1990s to \$100 to \$200 billion in 1999–2000 (figure 4.1). Nevertheless, the dollar value of electronic commerce transactions is less than 1 percent of the total U.S. gross domestic product (GDP) of \$23 trillion (and the business-to-business data refer to total turnover, not just value added). Consumer Internet purchases equal about two-thirds of 1 percent of retail sales of goods in the United States (U.S. Department of Commerce 1999), excluding services such as travel, tickets, and financial brokers, and about one-third of 1 percent in the United Kingdom and Germany (OECD 2000a).²

The importance of electronic commerce rests not in its current size but in the likely speed of its establishment as a significant vehicle for commerce and the potential for future growth. Electronic commerce is projected to reach \$4 trillion to \$6 trillion in the United States alone within the next three to four years (Bermudez and others 2000; *Economist* 1999).³ Electronic commerce may account for as much as 25 percent of world trade by 2005 (UNCTAD 1999).

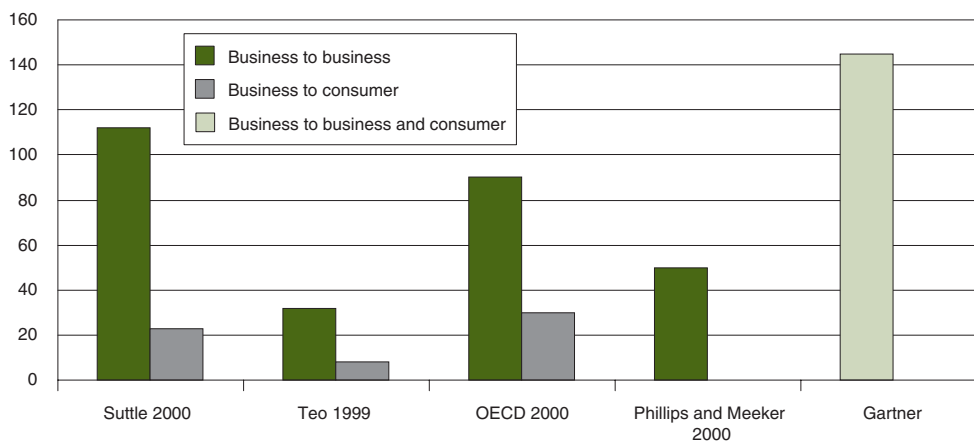
The digital divide

The distribution of Internet access among countries is severely unequal. Despite rapid growth in Internet access in developing countries, industrial countries still account for the majority of Internet subscribers (figure 4.2). More than 30 percent of U.S. residents had access to the Internet in 1999, compared with 0.5 percent in Sub-Saharan Africa (figure 4.3). Electronic commerce is also relatively small in most developing countries. In Latin America, for example, electronic commerce is estimated at \$459 million in 1999 (Lapper 2000), compared with a GDP of about \$2 trillion.

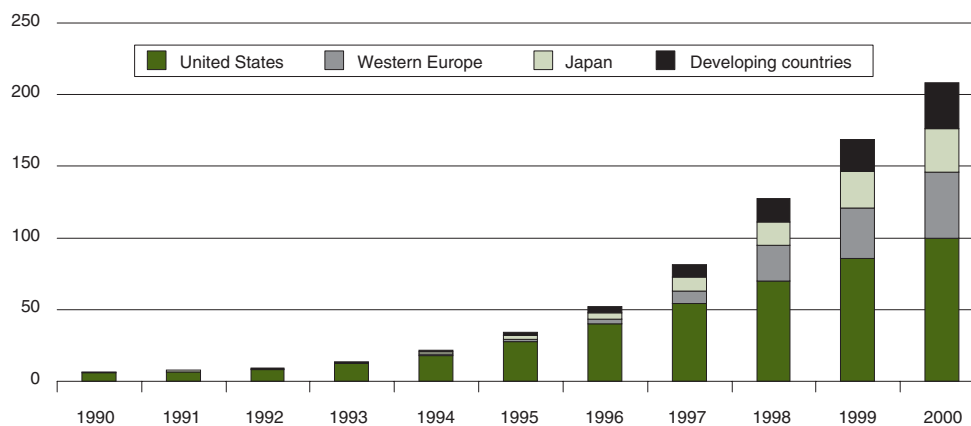
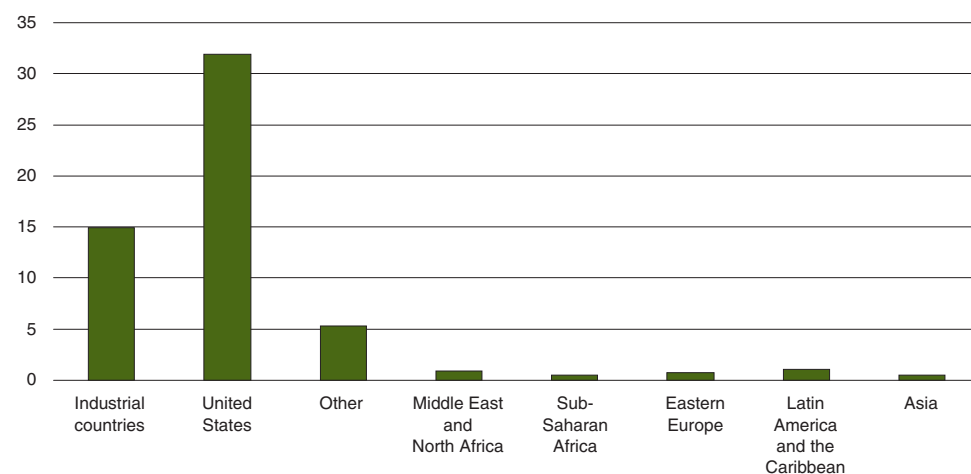
Internet access in the developing world varies greatly. Some countries, particularly in East Asia, have achieved impressive penetration rates. For example, the share of Internet subscribers in Korea has grown rapidly and is estimated at 20 percent of the population in 2000, above rates in most European countries (Grebb 2000). Although per capita subscriber rates in China and India remain low, these countries are so large that they have a critical mass of subscribers ready to benefit from the

Figure 4.1 Estimates of electronic commerce in industrial countries, 1999–2000

Billions of U.S. dollars



Source: See Suttle 2000 and so forth in the chapter references.

Figure 4.2 Estimates of Internet access, 1990–2000*Millions of subscribers**Source: Pyramid.***Figure 4.3 Regional Internet access***Percentage of population with access to the Internet**Source: Pyramid.*

Internet, a situation that increases the potential for electronic commerce transactions.

Analysis of Internet diffusion

The nascent condition of Internet diffusion in many developing countries reflects the constraints on Internet use, the most important of

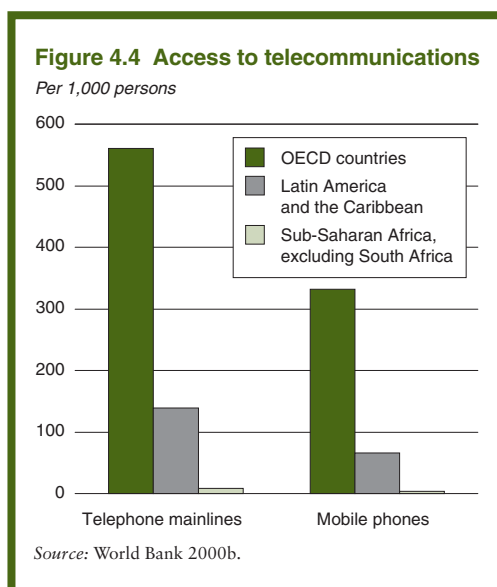
which is the availability of telecommunications services. Canning (1999) finds strong evidence that the quantity and quality of telecommunications services provided in a country is a significant determinant of the existence of Internet connections and the level of Internet use; to date, almost all Internet users have depended

on telephone lines for connection. The trends in “Internet intensity”—the ratio of Internet subscribers to available telephone lines—are remarkably similar across developing and industrial countries, however. Urban density and the policy environment for private sector development are strongly related to growth in Internet intensity.⁴ Many developing countries (including, on average, those in Asia, Latin America, and Sub-Saharan Africa) are experiencing much more rapid diffusion of the Internet for the given availability of telephone lines than is the United States. The digital divide results from differential access to telecommunications, not from the use of the Internet after telecommunications are available.

Unfortunately, the gap in telecommunications services between industrial and developing countries is large, so the digital divide is likely to remain wide for some time. The gap is also wide among developing countries, with the poorest countries being particularly disadvantaged. For example, the average OECD country had 70 times, and the average Latin American country had 17 times, the number of telephone mainlines than did countries in Sub-Saharan Africa (excluding South Africa) (figure 4.4). By some indicators, the digital divide is widening. Wilson and Rodriguez (2000) find that an index of between-country inequality in access to communications (the components are personal computers, Internet hosts, fax machines, mobile phones, and televisions) deteriorated substantially during the 1990s.⁵

Prospects for Internet access

Given the enormous investments required for telephone lines (and in some countries the continued dominance of the telephone system by inefficient monopolies), hopes for narrowing the digital divide rest largely on the spread of alternative means of accessing the Internet. The availability of cable, cellular phone, and satellite systems is likely to reduce dependence on telephone lines for access to the Internet during the next decade. Digital cellular telephone systems with Internet access are already spreading rapidly in Japan and Western Eu-



rope. Approximately 10 million users in Japan, or 40 percent of total users there, accessed the Internet through mobile telecommunications devices in May 2000 (Reuters 2000). Low-Earth-orbit satellite systems also have potential for reaching areas where telephone service is poor (Wood 1999).⁶ Work is underway to investigate the feasibility of Internet transmission through power lines.

All of these links to the Internet will bypass the often inefficient and difficult-to-build telephone networks now used for Internet access and will have substantially higher access speeds, although the forecasts in table 4.1 are speculative. The rapid diffusion of cellular phone and other systems with Internet access will mean that much of the Internet’s capacity

Table 4.1 Future Internet access speeds

Platform	Year available	Potential bandwidth
Cellular	1999	144 kilobits
	2000	1.6 megabits
	2003	5.2 megabits
Cable	2000	1–10 megabits
Satellite	2005	64 megabits
Power grid	(?)	2.5 gigabits (?)

Source: Harrow 2000; www.teledesic.com; www.mediafusioncorp.net.

may be available at relatively low cost in many developing countries. Although the most recent experience with wireless Internet access has been disappointing in some respects (witness the slow diffusion of Internet-enabled wireless phones in the United States), over the medium term these alternative Internet platforms are likely to give a significant boost to the spread of the Internet.

Some insight into the implications of new platforms for Internet access and electronic commerce can be gained by looking at the prospects for diffusion of cellular telephones. During the 1990s cell phone diffusion within countries was strongly influenced by per capita income, the change in per capita income, the size of the urban population, and the strength of the policy environment facing the private sector.⁷ Assuming future per capita income growth and policy performance will be equal to the 1990s experience, this equation forecasts very rapid growth in cell phone, and hence Internet, penetration during the next decade in all developing regions. Cell phone use in developing countries as a group would quadruple by 2010 compared with 1998.

Cell phone penetration would remain low relative to population, a projected 6 percent in 2010, compared with 2 percent in 1998. However, this figure does not imply that only 6 percent of developing country residents will have access to cell phones, given the potential for multiple use (although privacy concerns may constrain multiple use in some circumstances). For example, hundreds of people have access to the single cell phone provided to each village participating in the Bangladesh Village Pay Phone program.

Increased access to the Internet is only one precondition for effective participation in electronic commerce. Many developing countries, particularly the poorest ones, lack the human capital and complementary services required to make effective use of the latest technologies. There also is concern that developing country firms will face increasing challenges in competing with the leading firms in industrial countries, which have a headstart in using these

new technologies (although at the same time developing-country firms will benefit from lower prices and increased access to services offered by industrial country firms). Finally, an overly restrictive interpretation of current rules on intellectual property rights could constrain developing countries' access to some of these new technologies, which have largely been developed in the industrial world. One potential issue is the patenting of business processes and methods linked to the Internet; for the time being that practice is found only in the United States. International recognition of such patents could constrain the ability of firms in other countries to compete.

Effects on productivity in industrial and developing countries

Electronic commerce will generate productivity gains by reducing transaction costs. The rapid dissemination of information, the substitution of digital for paper record keeping, and the networking capabilities of the Internet will improve flexibility and responsiveness, encourage new and more efficient intermediaries, increase the use of outsourcing, reduce time to market by linking orders to production, and improve internal coordination. Although the effect of electronic commerce on productivity has probably been small to date (Oliner and Sichel 2000), simulations have indicated that electronic commerce could raise output levels by some 5 percent in the major industrial countries (Mann, Eckert, and Knight 2000; OECD 2000a).⁸ Firms can expect productivity gains through improved systems for procurement and inventory control and reduced costs of intermediation and sales transactions, as well as through more rapid diffusion of technology. Consumers also will benefit through reduced search costs, thus increasing competition and reducing prices.

Procurement and inventory control

Firms in developing countries can use the Internet to achieve the kinds of procurement and

inventory savings now enjoyed only by the largest firms that have established EDI systems, simply by purchasing “out of the box” electronic commerce applications (box 4.1). Goldman Sachs (1999) estimates that 30 percent or more of the total cost of intermediate goods typically are “process costs,” or the costs of administering transactions and maintaining inventories. The potential for savings can be divided into reduced processing costs of procurement transactions, reduced price of inputs attributable to increased competition, and improved inventory control.

Substituting the Internet for paper-based systems can reduce the cost of processing orders by saving staff time, speeding up the process, and reducing processing errors.⁹ Estimates of the savings in processing costs of Web-based procurement are 90–95 percent (Schwartz 2000; U.S. Department of Commerce 1999).

The use of online auctions also can reduce the price of inputs by improving transparency and facilitating competitive bidding. General Electric, for example, has cut the cost of purchased inputs by 10 to 20 percent through online bidding. The potential savings from increased transparency varies with the information content of the good. Goldman Sachs (1999) estimates that the savings from purchasing online may vary from 2 percent in relatively undifferentiated products (such as coal) to 40 percent in highly differentiated ones (some electronic components, for example).

Keeping an electronic inventory and transferring information on replenishment needs over the Internet enables producers and retailers to reduce the time that components and raw materials spend at each processing stage. Even relatively small reductions in inventory holding time in retail trade can mean substantial increases in profits because the average

Box 4.1 Electronic data interchange (EDI) systems

EDI systems provide one view of the potential efficiency gains from relying on the Internet for processing procurement and inventory control. These systems use proprietary software to connect purchasers’ and suppliers’ computers and to automate the transaction processing and information exchange. EDI is estimated to support about \$3 trillion in economic activity in the United States alone (Phillips and Meeker 2000). About 80 percent of the dollar value of intercompany transactions among Fortune 500 companies in the United States is conducted through EDI systems (Bermudez and others 2000). Despite this, only about 100,000 U.S. companies use EDI—out of the 2 million U.S. companies with 10 employees or more. The large investment required to develop proprietary software and the costs involved in integrating new suppliers effectively bars small firms from using EDI. By contrast, a large share of the investment required for similar systems over the Internet has already been made, and interactivity with other computers is automatically provided. Also, it is estimated that operating costs in

Internet-based systems are less than 1 percent of EDI systems (Xie 2000).

That large firms are willing to make huge fixed investments and pay high operating costs for EDI systems indicates the substantial gains that firms can capture by transferring from paper-based to electronic systems. The smaller initial investment and lower operating costs in Internet-based systems (along with greater flexibility and transparency of operations) means that small- and medium-size firms can capture these gains.

The migration of EDI systems to the Internet (to reduce operating costs and to improve flexibility) is likely to boost the dollar value of electronic commerce transactions over the next few years. This change will be slow because of the reluctance to abandon the huge fixed costs represented in EDI systems and the cost of conversion to Internet-based systems (Wenninger 1999). Concerns over the lower security of the Internet compared with that of proprietary EDI systems also may limit conversions.

cost to retailers of holding inventory for a year is at least 25 percent of the price, and margins may average only 3–4 percent (OECD 1999). Improved inventory control will enable firms to become more integrated with suppliers, thereby saving time and allowing greater production specialization. Increased production integration has led to a boom in specialized manufacturing firms that produce components for more well-known companies. A famous example is Cisco, whose components are made to Cisco's specifications by suppliers, tested through a connection to the Internet, and then shipped directly to the buyer.

Procurement in most developing countries is slower, less efficient, and more labor-intensive than in industrial countries, so the technical efficiency gains from transferring procurement systems to the Internet could be relatively large (although the lower cost of labor in developing countries means that the economic gains could be more limited than in industrial countries). The savings in working capital from reduced holding of inventories also would be significant in developing countries, where the cost of capital is high and credit is often rationed or unavailable. The lack of reliable telecommunications networks and complementary services—for example, transport facilities—may limit these gains, however. Some limited survey evidence (see appendix for description of survey) indicates that North American firms that were better at supply-chain management to begin with are cutting these costs by an even larger amount when using Internet-based inventory systems. This may be because an adequate supply of high-skilled workers and a flexible organization are required to reap the full benefits of these systems.

Reduced intermediary costs

Productivity gains can be derived from eliminating or improving the efficiency of intermediaries involved in marketing and distribution. Middlemen often charge substantial markups because of their knowledge about and contacts with suppliers. By greatly expanding ac-

cess to information, the Internet has enabled the elimination of retailers, wholesalers, and (in the case of intangible products) even distributors in some sectors. More commonly, existing middlemen have been replaced by new approaches to intermediation made possible by the technology—for example, online auctions and aggregators (firms that represent collections of buyers that can demand lower prices for bulk purchases).

The Internet also can generate significant cost savings in transport. The advertisement and trading of empty truck space over the Web is reducing costs per ton in the U.S. trucking sector (*Economist* 1999). According to one industry estimate, \$15 billion to \$20 billion annually in cost savings (4 to 5 percent of output in the U.S. trucking industry) may be realized (*Business 2.0* 1999).

Eliminating or transforming intermediary functions will enable developing-country producers to access both domestic and foreign markets at lower cost. By contrast, firms in developing countries whose main purpose is to help domestic companies trade with international markets will be at particular risk. Network externalities, combined with a low marginal cost of adding new users, mean that the market for providing intermediary services offers considerable advantage to the first company on the scene. Thus the later-arriving and less technologically sophisticated firms in many developing countries may have difficulty competing with industrial country firms as Internet-based intermediaries (UNCTAD 2000). Developing countries also may not be able to capture the cost savings from reduced intermediation in some sectors, such as primary commodity exports, where purchasers are likely to be the major beneficiaries of any cost savings (box 4.2).

Retail transactions

The Internet offers the potential for savings in retail transactions compared with traditional systems. OECD (1998b) suggests that the greater availability of information to the

Box 4.2 The Internet and primary commodity exporters

Electronic commerce may affect relatively homogeneous primary commodities less than it does more differentiated products because most of the necessary information is contained in the product price. Although electronic commerce is likely to provide some benefits to producers by increasing the efficiency of commodity markets, the major benefits will accrue to purchasers.

More timely access to market information about prices could generate benefits to producers. Small-holder farmers in remote areas could check the prices in the nearest market (which could be a considerable journey if done in person) before deciding whether to sell to local middlemen; such a capability could potentially improve the farmers' bargaining position with local and foreign buyers. The Internet also could provide producers with better information about input prices and product availability and easier access to training about best production practices.

Several firms have projected that a large share of commodity trade will occur over the Internet

(for example, Forrester Research 1999a), but the efficiency gains will vary depending on the commodity. Commodities already traded on established exchanges (such as wheat), with widely disseminated information on prices and centralized trading, may not be greatly affected. Online auctions will have a greater role in reducing margins for commodities (such as fertilizer) that trade through brokers with limited price transparency. For example, brokerage fees in the sugar trade, which range from 0.5 to 1.0 percent of the value of the commodity, may decline as more trade is done over the Internet.

Producers in developing countries are unlikely to see substantial increases in incomes from lower trading and marketing costs; rather, these gains will accrue to the consumer through lower prices for final products. Lower consumer prices may increase demand only slightly, because the demand for most commodities is price inelastic and the reduction in marketing costs will probably be small.

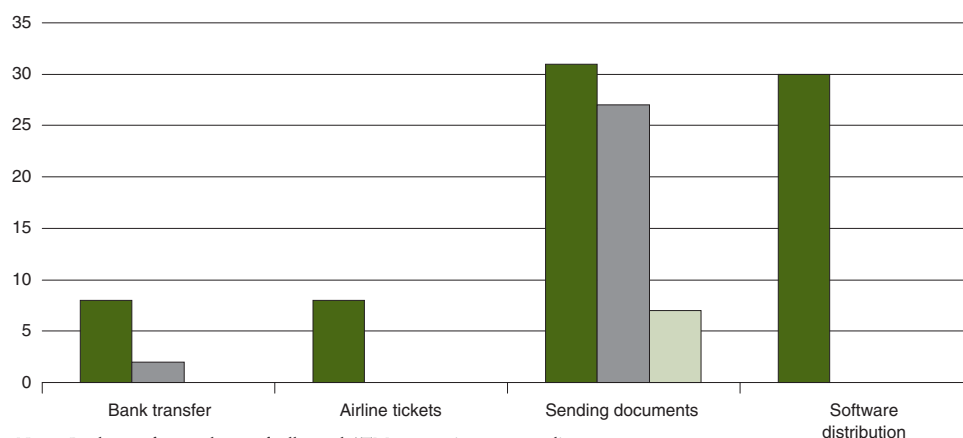
consumer and savings on providing services could increase the productivity of sales staff in OECD countries by a factor of 10. The evidence on the sale of goods over the Internet so far does not show large savings, however. Preliminary studies found that goods sold on the Internet were priced the same or higher than in stores (Goldman Sachs 1997; Krantz 1998; Lee, Westland, and Hong 2000; OECD 1998a). Other studies estimated that books and compact discs (CDs) were 10 percent cheaper on the Internet (*Economist* 2000; Oliner and Sichel 2000).¹⁰ The potential savings in service transactions are more impressive. For example, the total cost (including investment) of bank transfers over the Internet is half that of existing automated systems and one-eighth that of transactions using tellers (WTO 1998; figure 4.5). Note that a portion of this savings reflects efficiency gains, while another portion

reflects the transfer of costs from producers to consumers in the form of time spent searching the Internet.

The lower cost of service transactions is likely to have a less significant effect in developing than in industrial countries because the lower wages paid in developing countries mean that firms have less incentive to undertake the fixed costs involved in setting up electronic systems. Also, poor distribution systems, inadequate protection against credit card fraud, and limited consumer Internet access constrain the potential for business to consumer commerce in many developing countries.

Knowledge acquisition and technology diffusion

Easier access to knowledge through the Internet will speed technology diffusion, which is of critical importance to developing countries

Figure 4.5 Cost savings from electronic commerce*Ratio of cost of traditional process to Internet*

Notes: Bank transfer: total cost of teller and ATM transaction versus online.

Airline tickets: travel agent booking via computer reservations system versus consumer booking online.

Sending documents: send a 42-page document by fax, courier, and airmail relative to e-mail.

Software distribution: download to CD and ship versus electronic transmission.

Source: Kibati 1999, OECD 1999, WTO 1998.

because they tend to operate within the technological frontier. Electronic commerce can reduce the costs of communication between geographically distant partners and lower the search-and-compare costs involved in finding potential business partners and technologies. Moreover, the Internet provides a radial structure for interpersonal communication networks. Bulletin boards and news servers allow individuals to exchange information faster and within a wider environment than with networks based on telephone and fax. Connolly (1998) found that differences in communication and transportation infrastructure were significantly related to differences in the rate of product imitation encouraged by foreign direct investment (although this does not necessarily mean that electronic commerce has an independent positive effect). Grossman and Helpman (1991) argue that international contacts enable a country to obtain foreign technologies and adjust them to domestic use, an important channel through which the productivity levels of industrial and developing countries are interrelated. Such international “net-

working” is greatly facilitated by the Internet. Harris (1998) quotes a Neilson survey that found business’s primary use of the Internet was for gathering information.

Effects on international trade in developing countries

By opening markets to a wider range of potential buyers and sellers, the Internet is likely to foster a greater volume and variety of trade. The Internet could erode an important advantage now enjoyed by firms in industrial countries: proximity to wealthy customers. For example, the Internet reduces the cost of producing customized products designed for distant markets; consumers in the United States can purchase a hand-sewn suit made by a tailor in Shanghai without ever visiting China (Xie 2000).

Service exports

The Internet will reduce barriers to the sale of services embodying skilled labor (Harris 1998).¹¹ In the Philippines, for example, com-

panies use the Internet to provide accounting services, process insurance claims, and track credit card defaulters for firms in industrial countries (Jordan and Hilsenrath 2000). In India workers have been transcribing U.S. physicians' oral records into written files since 1996, at one-tenth the cost of U.S. transcription services (Mills 1996).¹² Schuknecht and Perez-Esteve (1999) suggest that financial, insurance, and other business and communication services are likely to see the greatest impact from electronic commerce.

Multinational supply chains

The Internet's impact on access to multinational supply chains by firms in developing countries is uncertain. Increased information on these firms may improve their access to multinationals, which tend to use suppliers with whom they have experience. Goldman Sachs (1999) estimates that, because of poor research, firms' purchasing managers tend to award 90 percent of their procurement contracts to about 20 percent of suppliers. At the same time, suppliers with poor hardware, software, and Internet transmission capabilities may be unable to compete with better-connected companies. It is unclear whether the new online auction systems have resulted in the expansion of supply networks. General Electric, for one example, may be increasing the number of its suppliers through its online bidding site for procurement.

A lack of credibility may make it difficult for firms in developing countries to access online auctions. Purchasers need to have confidence that suppliers will provide input on time and in conformance with specifications, and product quality may not be known ex ante. More than half of 35 large firms using online auction or exchange sites said that they would not do business through online Web sites with firms they did not know (Forrester Research 1999b). Interview results indicate buyers—typically firms in industrial countries—see an especially high risk in purchasing from firms in developing countries. Over time, greater use may be made of certification agencies (such as

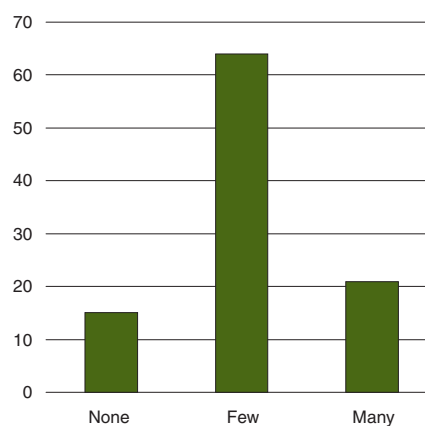
the International Standards Organization and the International Electrotechnical Commission) to assess independently the quality of new firms' products and services. However, relatively few small firms, even in industrial countries, use the certification services these bodies provide, because of the cost and fears that certification may not fully address buyers' concerns in the markets where small firms compete (Callaghan and Schnoll 1997).

Online advertisement

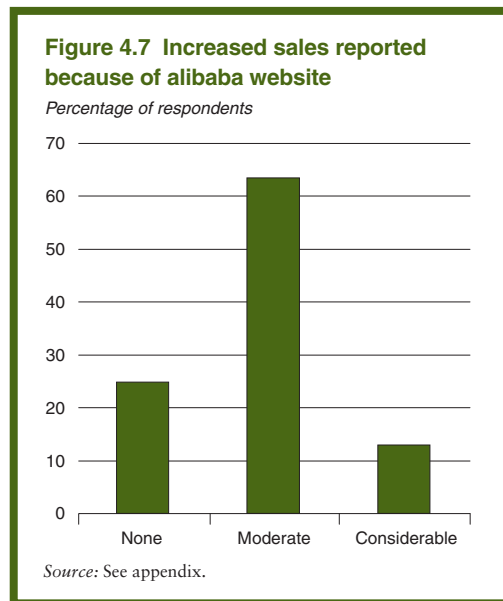
New websites are emerging that provide a venue for smaller firms to advertise their goods, and buyers to advertise their product needs.¹³ A survey of one of the best-known advertising websites (www.alibaba.com), which has grown to 200,000 subscribers since its April 1999 inception, indicates that the impact has been modest so far, although it is too early to judge the site's full potential. Most participants say they have found only a few new customers so far. Only 13 percent of firms reported that total sales had gone up considerably since posting on the website, whereas 64 percent reported some increase and the rest none (no firm reported a decline in sales). However, 87 percent of the firms viewed the

Figure 4.6 New customers gained from alibaba website

Percentage of respondents



Source: See appendix.



website as helpful or very helpful, with the smaller firms showing the greatest enthusiasm.

Effects on income distribution

The Internet improves access to and use of information, which increases the productivity of capital, thus raising its return relative to labor (Rodriguez 2000). The Internet also increases the demand for skilled labor, particularly in the information technology sector. By contrast, better information will tend to reduce the demand for, and hence the relative return to, unskilled labor involved in the routine processing of transactions and (perhaps) retail sales.¹⁴ There is a risk that this divergence in demand for skilled versus unskilled labor could increase inequality between industrial and developing economies as well as within developing economies.¹⁵ Any rise in inequality may be exacerbated by opportunities for migration as skills shortages in the information technology sectors intensify in industrial countries. Electronic commerce also may increase regional inequality. In many developing nations, Internet services rarely spread beyond the country's capital and a few large urban centers. In Kenya, for example, more than

85 percent of Internet users are in Nairobi (Jensen 1999; Kibati 1999).

Some aspects of electronic commerce could mitigate its impact on inequality, particularly on the poor, in developing countries. The fall in production costs is likely to increase the demand for all workers, despite the fall in the per unit labor input in production. Although inequality may increase, the income of the poor may rise. Also, electronic commerce increases market transparency, thus reducing search costs and reliance on intermediaries. These effects reduce the price of skill-intensive goods, thus raising the real incomes of workers generally, although the poor are unlikely to benefit greatly as consumers because of their limited access.

A direct impact of technological change on inequality in developing countries has been difficult to show empirically, perhaps because the adoption of new technologies has coincided with economywide structural reform (Rodriguez 2000). Studies have shown that for industrial countries, the recent rise in income inequality has occurred during a period of rapid technological change in the information technology sector.¹⁶

Impediments to Internet use and the role of policies in developing countries

The presence of network externalities, where all participants gain from each addition to the network, implies that market prices may not fully reflect the total benefit to society from increased Internet access. Thus government has an important role in speeding Internet diffusion. Inappropriate policies and the lack of complementary services, particularly affecting the telecommunications sector, other infrastructure, human capital, and the investment environment severely constrain Internet access in developing countries.

Telecommunications

Poor telecommunications will limit the growth of electronic commerce. Required telecommu-

nications facilities include transmission facilities connecting a country's domestic network to the greater Internet, the domestic Internet backbone, and connections from homes and businesses to the backbone network. The defects of domestic telecommunications services may be less important for the larger firms in developing countries; these firms may find it profitable to invest in telecommunications facilities (such as wireless) that bypass the local network.

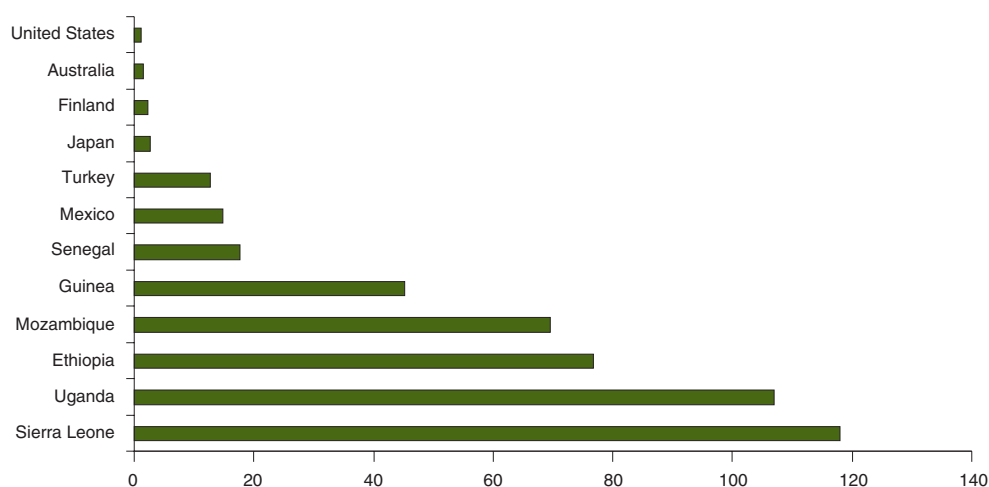
State or privatized monopolies that control international connections impose inefficient pricing structures and conditions,¹⁷ which means that many Internet service providers cannot afford to buy enough transmission capacity for electronic commerce applications to function without congestion. This poor state of domestic backbone networks results in a large volume of domestic Internet traffic being sent to the United States before being returned to its region of origin (Cukier 1999). A growing number of African Internet sites are hosted on servers in Europe or the United States because of poor infrastructure (Jensen 1999). Hence,

even traffic that originates and terminates domestically can cost the same as international transmission.

The high cost of Internet access, the lack of local loop infrastructure necessary for basic dial-up modem access, and the poor quality of the local loop infrastructure that does exist all impede connections to the domestic backbone. Country comparisons show a strong relationship between usage price and Internet penetration; for industrial countries the correlation between the Internet hosts per capita and the average cost of Internet access from 1995 to 2000 is -0.73 (EU Commission 2000; OECD 2000c). Developing countries face much higher costs relative to incomes than do industrial countries (figure 4.8). For example, surveys indicate that some users in Beijing may spend an average of 35 percent of take-home salaries on Internet access charges (Rosen 1999).

Internet use appears to be higher in countries where local phone service is charged at a fixed rate than in those where callers are billed by the minute. For example, in most Latin American countries (Mexico being the major

Figure 4.8 Internet monthly access charge as a percentage of GDP per capita, 1998



Source: ITU 1999.

exception), local calls are charged per unit of time (Oxford Analytica 1999), and telephone charges account for 40 percent of monthly access costs (E-Marketer 2000). In the United States the marginal cost of local calls is zero. Note that subsidizing Internet access through flat rate charges for local calls may discourage investment in alternative forms of Internet access that ultimately could be more efficient (EU Commission 2000).

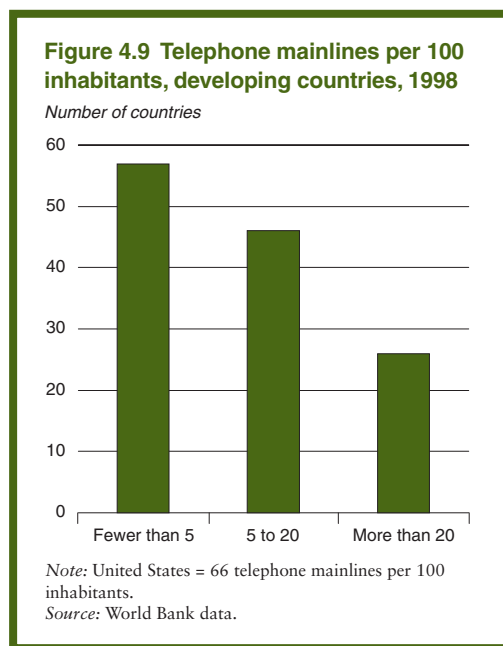
For many developing countries, the most important issue is the lack of telephone service to homes and businesses. Despite increases in rates of telephone line penetration during the 1990s, more than one-third of the 130 developing countries (excluding small islands) with data for 1998 have fewer than 5 telephone lines per 100 inhabitants (figure 4.9). The comparable level in the United States is 66.

The quality of access also is important, as some electronic commerce applications that rely on sophisticated technology and high user interactivity require low congestion and high bandwidth transmission between the user's access device and the host server. The most popular alternatives by which developing countries

can overcome inadequate local loop infrastructure have been either shared facilities or wireless local loop. Shared facilities, which involve local entrepreneurs selling the use of a computer with Internet access, are a fast and relatively cheap way of increasing Internet use. For example, the number of Internet users on each Internet account in Egypt is estimated to be between 2.5 and 4.5 people (El-Nawawy and Ismail 1999). Public access Internet cafés exist in some 110 countries (Rao 1999).

Wireless and satellite technologies also provide an alternative to the high costs and inefficiencies of many domestic telecommunications systems. Although currently used primarily for voice, mobile phones "soon will be a much better device for many of the usual Internet applications," according to some technologists.¹⁸ Cellular phones in some developing countries have experienced strong growth rates and relatively high penetration, similar to those in industrial countries. In Haiti, for example, poor telephone service (0.9 phone lines per 100 people, less than half Africa's average, and huge waiting lists for new lines) has led to the growth of wireless service (Peha 1999). In 1998 Ecuador, the Slovak Republic, and Western Samoa had ratios of cellular phone subscriptions to regular phone service similar to those of industrial countries (ITU 1998). On average, however, cellular phone penetration remains well below industrial-country levels. Sub-Saharan Africa averages 5 cellular phones per 1,000 people, compared with 265 cellular phones for every 1,000 people in high-income countries (World Bank 2000b).

Impressive increases in penetration can be achieved through increasing competition, although in some cases privatization has meant reducing subsidies to local calls, with a negative impact on Web access, at least in the short term (Zambrano 1999). The relative level of capital spending on communication infrastructure and development of Internet application software generally tends to be higher and more advanced in those industrial countries that liberalized telecommunications markets earlier (OECD 2000a). Perhaps as a result of



privatization and liberalization, Africa has recorded its highest annual growth rate in main telephone lines for a decade (AED 1998a). Figure 4.10 reveals the growing trend of privatization in the telecommunications sectors of developing countries.

Other infrastructure

Poor infrastructure services (other than telecommunications) are an important constraint on electronic commerce. Frequent and long power interruptions can seriously interfere with data transmission and systems performance, so many Bangalore software firms have their own generators (Panagariya 1999). Mail service can be unreliable, expensive, and time-consuming in many developing countries. For example, the unreliability of postal services in Latin America has meant that more expensive courier services must be used to deliver goods ordered over the Internet, and in response, international courier services are setting up special distribution systems in Miami (Lapper 2000; Oxford Analytica 1999).

The lack of safeguards against fraud can severely restrict credit card purchases, the most common means of conducting transactions over the Internet. For example, many Latin

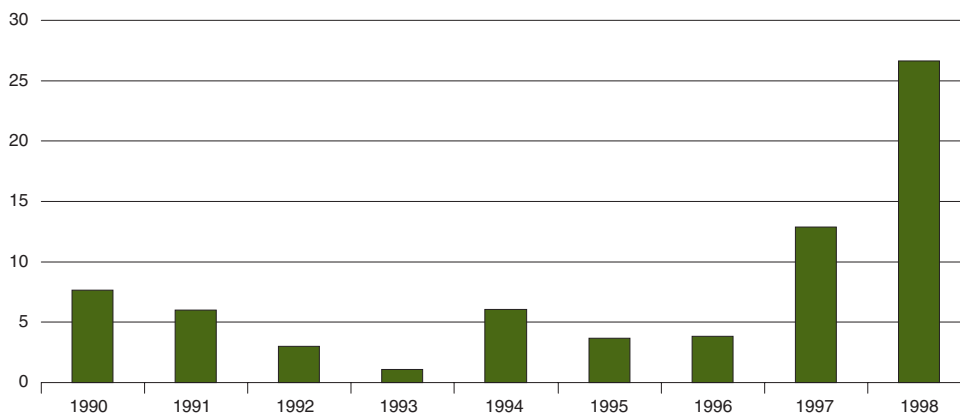
American consumers are unwilling to purchase goods over the Internet because credit card companies will not compensate holders for fraudulent use of cards (in many industrial countries, cardholders have only a limited exposure to loss). This lack of security does not make consumer purchases on the Internet impossible. In China, companies are depending on cash payments and local distribution through taxis and bicycles to reach consumers (Fan 2000).

Human capital

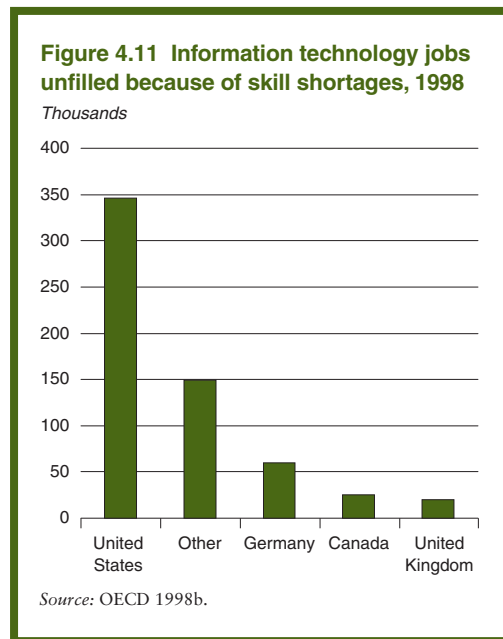
A critical mass of highly skilled labor is needed in developing countries to supply the necessary applications, provide support, and disseminate relevant technical knowledge for electronic commerce. The work force in many developing countries lacks a sufficient supply of these skills, and the demand for this specialized labor from industrial countries has further strained the supply of this labor in developing countries. In the mid-1990s North America and Europe had unfilled demand for professionals trained in information technology (figure 4.11). The wages of workers in information technology industries continue to rise more rapidly than those of workers in other

Figure 4.10 Developing country privatization in telecommunications, 1990–98

Billions of U.S. dollars



Source: World Bank 2000b.



U.S. industries (U.S. Department of Commerce 1999). U.S. firms will be able to fill only half of the estimated 1.6 million positions open in 2000 (ITAA 2000), while the shortfall of information technology workers is estimated at almost 1 million in Japan (OECD 2000b).

At the same time, Harris (1998) notes that the Internet also facilitates the mobility of skilled labor services. Workers can choose to remain in their own country while exporting labor services to higher-paying industrial countries.¹⁹ Developing countries may also reap some benefits from migration. For example, Indians in Silicon Valley have played a role in providing capital, expertise, and business contacts to Indians in the software exporting firms of Bangalore.

Investment environment

Several regulatory impediments to the widespread adoption of electronic commerce exist in many developing countries. Duties and taxes on computer hardware and software and communication equipment increase the expense of connecting to the Internet. For example, a computer imported into some African countries may

be taxed at rates exceeding 50 percent. The overall environment for private sector activities is a significant determinant of Internet service diffusion. An open foreign direct investment regime helps promote technology diffusion, which is important to the growth of electronic commerce. Foreign direct investment also is one channel that could facilitate certification of domestic firms for access to online auctions.

Governments also can play an important role in supporting the certification of firms by providing information on certification procedures, promoting access by domestic firms to international organizations and firms that provide certification, and perhaps subsidizing the costs of certification to demonstrate the kinds of resources available in the domestic market. This role will be particularly important (at least in a transitional sense) as the intermediaries that formerly helped connect developing-country firms to international markets are replaced by Web-based intermediaries that may have less information on developing countries.

Governments must provide a supportive legal framework for electronic transactions, including recognition of digital signatures; legal admissibility of electronic contracts; and establishment of data storage requirements in paper form, intellectual property rights for digital content, liability of Internet service providers, privacy of personal data, and mechanisms for resolving disputes. The U.N. Commission on International Trade Law has a "Model Law on Electronic Commerce" that offers national legislatures legal principles and guidelines for dealing with some of these issues (Price Waterhouse Coopers 1999; UNCTAD 2000).

Governments also have had considerable impact on Internet use through direct interventions. Singapore is providing grants to local companies to encourage participation in electronic commerce (Price Waterhouse Coopers 1999). Malaysia is wiring a zone south of Kuala Lumpur with fast communications (Bickers 1999). The "Wiring the Border" project is providing subsidies to small businesses along the Mexico-U.S. border to finance Inter-

net access. The U.S. Department of Defense played a critical role in developing the initial networking technologies (Goodman and others 1994). The U.S. government also financed the original Internet backbone until increased demand for services led to the creation of commercial backbones; a similar pattern was followed in several other industrial countries (Braga and Fink 1997). Despite some success stories, however, the rapidity of technological change greatly increases the riskiness of government interventions to support Internet access. The expenditure of billions of dollars to connect schools to the Internet through telephone lines could be wasted if wireless or power line technology turns out to be less expensive (Davis and Seib 2000). Furthermore, government investments may crowd out private sector initiatives that could provide services more efficiently.

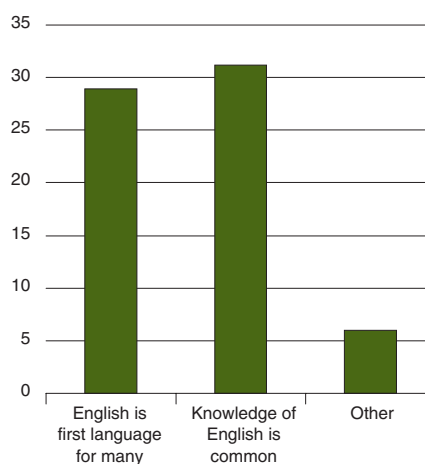
Finally, government can support the spread of the Internet by switching to online services for its own transactions. Public sector procurement, many aspects of tax and customs administration, the processing of routine applications (such as car permits and real estate licenses) and other governmental functions can often be carried out through the Internet. Decisions on the use of the Internet in public administration should be based on the costs of providing services relative to paper-based processes, the capability of government personnel, and the extent of demand. Nevertheless, greater government use of the Internet can play a role in encouraging public participation.

Language

That most Internet business is conducted in English is currently an important constraint on using the Internet. Estimates of the share of English used on the Internet range from 70 to 80 percent, but only 57 percent of Internet users have English as their first language (ITU 1999; Vehovar, Batagelj, and Lozar 1999). Per capita Internet use averages about 30 percent in those industrial countries where English is common, compared with about 5 percent in other industrial countries (figure 4.12). Famil-

Figure 4.12 Internet use in industrial countries by knowledge of English, 1998–99

Percentage of population



First group: Australia, Canada, Ireland, United Kingdom, United States.

Second group: Denmark, Finland, Norway, Sweden.

Third group: Austria, Belgium, France, Germany, Greece, Italy, Japan, Portugal, Spain, Switzerland.

Source: www.headcount.com

ilarity with English was the principal determinant of Internet use in Slovenia, for all economic groups (Vehovar, Batagelj, and Lozar 1999). Conversely, Internet content is limited in the local language of most developing countries. From a commercial aspect, Schmitt (2000) found that just 37 percent of Fortune 100 Web sites support a language other than English.²⁰

The amount of non-English material on the Web is growing, however. Spanish websites in particular are increasing, in part to serve the large Spanish-speaking community in the United States (Vogel and Druckerman 2000). Improvements in translation services (by people and machines), as well as Web browsers that recognize characters of different languages, should ease language constraints (U.S. Department of Commerce 1999). There is growing recognition that English-only content is insufficient for an international economy.²¹

Challenges to regulatory regimes in developing countries

Electronic commerce will pose difficult challenges for government regulation of tax and financial systems. The growth of electronic commerce will encourage tax competition and may facilitate some forms of tax evasion. Competitive pressures in domestic banking systems will rise, generating substantial benefits to consumers and firms but potentially lowering the franchise value of existing banks.

Tax policy

The growth of electronic commerce will present some challenges to tax enforcement in developing countries and place increased emphasis on improving the technological sophistication of tax authorities and on international coordination of tax collection efforts. The Internet reduces the cost to firms of being physically far away from customers and increases the ability of companies to relocate production, because a substantial share of the work involved in organizing production is carried out by computers that can be located anywhere. Thus multinationals will find it easier to shift activities to low-tax regimes. Governments may find it more difficult to impose desired income tax levels on existing corporations, and competition among developing countries for investment by multinationals may rise. This situation will place a greater premium on efforts to reach agreements among developing countries to limit this kind of competition.

In addition, some of the new transactions conducted through electronic commerce will be difficult to monitor. Government may not be able to detect the transfer of digitized material and thus know that a taxable transaction has occurred.²² It may also be difficult to control such transactions through the supplier because companies can easily provide such services from other jurisdictions. Thus effective international agreements to assist with tax enforcement will be important.

The Internet increases the potential for consumer-to-consumer purchases and for barter

transactions, which also are difficult to monitor. Barter exchanges using digital money are small now, but the potential for growth could be great when a critical mass of participants is reached (*Washington Post* 2000). Reduced transaction costs also might make it easier for taxpayers to hide potentially taxable activities. The impact of electronic commerce on tax evasion should not be overestimated, however. The sale of domestic goods will still be controlled by monitoring companies' transactions, and imported goods will be controlled at the border.

Tax authorities will require greater expertise in information technology, both to improve the efficiency of tax administration and to enhance government ability to obtain and understand records of electronic transactions. In this respect, the greater transparency and ease of retrieval of electronic transactions (compared with paper processes) could assist tax enforcement.

Financial sector and capital flows

Electronic commerce could pose a significant challenge to government regulation of the financial sector by reducing the franchise value of domestic banks, thus increasing the incentive for banks to undertake excessive risk. At the same time, electronic commerce will generate substantial benefits to consumers and firms that rely on banking services. Competition in domestic banking systems will increase because of reduced costs, greater access by foreign banks, and greater reliance on capital markets by former bank borrowers.

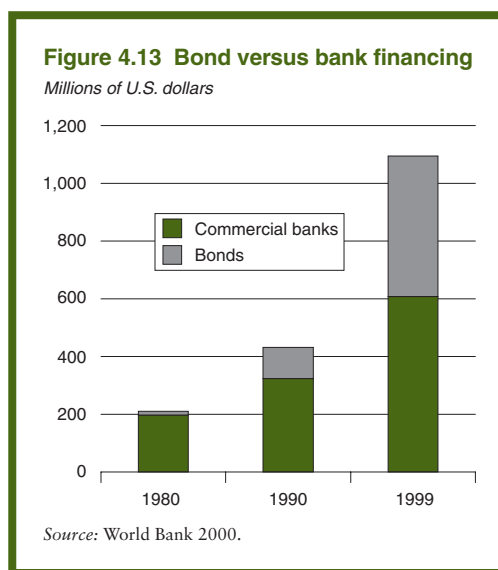
Online banking may reduce banking transaction costs by 15–25 percent compared with regular accounts (Morgan Stanley Dean Witter 1999). Enhanced transparency and competition will mean that a large part of these cost reductions are transmitted to the consumers of banking services. In fact, some degree of price competition among banks is already becoming apparent in the emerging economies (Goldman Sachs 2000).

The Internet will greatly increase the ability of foreign banks to compete in developing

countries' domestic markets. The geographic location of the consumer and the service provider will become increasingly irrelevant, eroding the local banks' advantage of having large branch networks. First-mover advantages, economies of scale, and reputational advantages backed by strong supervisory systems will strengthen the competitive position of industrial-country banks. They will be in a better position than domestic banks to offer integrated trade payments systems, in which customers can obtain applications for a letter of credit, care of credit approvals, telegraphic transfers, invoices, and confirmations (Granittas 2000). One indication of the potential for foreign firms' inroads into developing country banking systems comes from a 1997 study, which indicated that U.S. and U.K. firms dominated global Internet financial services market because of their reputations, head start, and the predominance of English on the Internet (OECD 1999).

Furthermore, the Internet will reduce the advantage that domestic banks enjoy from having a monopoly on information about their clients. Local banks often are better placed than foreign lenders to monitor the financial position of domestic firms (Eichengreen and Mody 1999). This advantage has enabled domestic banks to play an important role in on lending international capital flows to domestic borrowers; domestic banks accounted for as much as 46 percent of net long-term capital flows to developing countries in 1997 (World Bank 1999). Domestic banks may experience sharper competition for making loans in their own markets, as the Internet makes information about borrowers more accessible to international lenders.

The easier dissemination of credit information made possible by the Internet is likely to strengthen the trend toward greater reliance on bond financing in developing countries, potentially at the expense of domestic banks. The number of firms in developing countries with access to international bond markets increased more than sixfold from 1991 to 1998 (Eichengreen and Mody 1999), and the share



of private source debt that was held in bonds in developing countries rose from about one-fourth in 1990 to more than one-half in 1999 (figure 4.13). Currently, leading rating companies rate only several hundred corporate and foreign bonds. A private initiative is underway to rate millions of companies on the Internet by merging credit management techniques with collecting and organizing information on companies (UNCTAD 2000; www.cfaced.com). Furthermore, with a huge pool of rated companies, it would become possible to issue guarantees based on estimated default probabilities and to securitize these guarantees through the capital markets.

International coordination

Electronic commerce raises several regulatory issues that should be addressed through improved international coordination. The importance of international cooperation to tax administration was noted earlier. Ensuring open access for the international transmission of goods delivered electronically would facilitate the continued growth of electronic commerce. Members of the World Trade Organization have decided provisionally to exempt such goods from customs duties.²³ A more im-

portant contribution to ensuring open access would be to secure agreement on barrier-free treatment of electronically delivered services, by strengthening commitments entered into under the General Agreement on Trade in Services (Mattoo and Schuknecht 2000).

More generally, the rise in the volume of cross-border transactions promised through the spread of the Internet will raise a host of issues requiring international agreement. Examples include improved procedures for allocating domain names used for Internet locations;²⁴ agreement on privacy standards for data generated through commercial transactions; closer coordination of antitrust reviews to reduce the administrative burden imposed on companies; and efforts to harmonize the laws governing electronic commerce transactions. Electronic commerce will further speed the process of globalization and thus will underline the importance of an effective international framework for cross-border transactions.

Notes

1. See OECD 1999 and UNCTAD 2000 for a more detailed discussion of the definition of electronic commerce.

2. These estimates exclude sales where the Internet is used as an information resource only. In some service sectors, the penetration of electronic commerce is relatively high. In the United States, for example, electronic commerce accounts for some 25 percent of stock trades.

3. These figures vary greatly depending on the definition of electronic commerce used. Projections of trillions of dollars of electronic commerce in part reflect the migration of EDI systems to the Internet. Moreover, these forecasts are extremely speculative. As indicated earlier, estimates of even the *current* size of electronic commerce differ substantially.

4. The regression is $\log(I/T\ 1997) - \log(I/T\ 1990) = -14.76 - 1.04\log(I/T\ 1999) + .86\log(\text{urban pop } 1999) - .10\log(\text{income } 1990) + .61\log(\text{policy})$. All coefficients are significant except income. Regional dummy variables are also included. *R*-squared is .97. *I/T* stands for Internet intensity.

5. Between-country inequality of access to components of this index (such as mobile phones) appears to have declined during the 1990s. Thus trends in the digital divide may differ significantly among different kinds of communications media.

6. Companies such as Teledesic and Skybridge plan to launch satellite systems capable of supporting high-speed Internet access for millions of users. So far the failure of the Iridium system has not derailed these plans.

7. The regression equation is $\log(\text{cell } 99) - \log(\text{cell } 90) = -9.16 - .84\log(\text{cell } 90) + .78\log(\text{urban pop } 90) + 2.12[\log(\text{income } 99) - \log(\text{income } 90)] + .78\log(\text{income } 90) + 1.06\log(\text{policy})$. *R*-squared is .78. Observations = 99.

8. These studies are by their nature speculative, however, and the results require several restrictive assumptions that may or may not reflect actual events (OECD 2000a).

9. At Cisco the replacement of phone, fax, and e-mail ordering by electronic commerce systems cut the number of orders that had to be reworked from 25 percent to 2 percent (OECD 1999).

10. The use of discounts to increase market share, coupled with the lack of profits, leaves some doubt as to whether these lower prices reflect efficiency gains, however.

11. See World Bank 1995 for an earlier discussion of the potential for long-distance service exports from developing countries.

12. The potential for exports of Internet-based services by developing countries in the medical sector is staggering. About one-third of the cost of health care in the United States, or some \$300 billion a year, represents the cost of capturing, storing, and processing information such as records, physicians' notes, test results, and insurance claims (Evans and Wurster 1997).

13. Examples include www.indiaonestop.com; www.in-business.com.ar/mall/; www.maquilamarket.com; and mm.malaysiadirectory.com/b2b/, which focus mainly on markets in India, Argentina, Mexico, and Malaysia, respectively. The World Bank is providing support to the Virtual Souk, an online marketplace for artisans in the Middle East and North Africa, owned by local nongovernmental organizations and cooperatives.

14. Note that the Internet also enables service transactions that would not otherwise have occurred, which increases the demand for literate but not highly skilled workers in developing countries.

15. Inequality is affected by many factors, and the strength of this effect is unknown. Thus, whether the Internet will ultimately have a significant impact on inequality remains uncertain.

16. For example, see Autor, Katz, and Krueger 1998; Bresnahan and Brynjolfsson 1998; Krueger 1993.

17. In Egypt, for example, El-Nawawy and Ismail (1999) report that the cost of an international half circuit can be 2.5 times the international tariff.

18. Helft 2000.

19. Harris (1998) goes further to say that "the Internet can eliminate the scale disadvantage of small

regions in producing services ... [and] then can potentially lead to in-migration of skilled labor to the region."

20. DePalma, McCarthy, and Armstrong (1998) found that although 49 of 50 companies surveyed had operations outside the United States, and 80 percent print marketing material in other languages, only five said that their multilingual sites were as functionally rich as their English sites.

21. Advertisements have appeared in U.S. business magazines highlighting the need for Internet content to be written in other languages in addition to English. Schmitt (2000) warns businesses that English-only sites are no longer feasible for international companies.

22. According to Bach and Erber (1999), it is virtually impossible to enforce taxes on electronic transactions. This conclusion is uncertain, however, and its accuracy will depend on whether the evolution of Internet technology ultimately favors privacy over government monitoring.

23. The impact of this decision on government revenues should be slight because the tariff lost if no taxes are levied on digitizable goods is less than one-fifth of 1 percent of total revenues in the major developing country importers (Matoo and Schuknecht 2000).

24. The World Intellectual Property Organization issued a detailed report on the intellectual property issues associated with domain names and has developed an online system to assist in resolving disputes (UNCTAD 2000).

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Appendix:

firm interviews and survey

Firm interviews

The interview information included in the chapter is based on conversations with:

- managers or executives from five multinational firms: Ingram Micro, The Gap, Ford, General Electric, and Infosys. These specialize in computer hardware and software distribution; apparel; automobiles; electrical and lighting equipment; and customs software, respectively. The first four appeared on this year's Fortune-200 list, while the last is a major Indian-based multinational software company.
- representatives from: (i) the U.S.-Mexico and US-Philippines Chambers of Commerce; as well as from: (ii) the offices of the Commercial or Trade Attaches representing Taiwan (China) and Brazil in the United States.

- participants in a conference on the May 24, 2000, "Wiring the Border" program, including representatives from small-business associations, technology specialists, government officials, and academic experts.

Website survey

The conclusions on the alibaba website are based on a survey of firms via fax, conducted in May 2000. To keep the survey manageable, the firms to be contacted were chosen from selected economic subsectors. Within these subsectors, we included all firms posting offers in the last two weeks of April 2000—whether as sellers or buyers. We received 105 complete replies to our questionnaire from the 800 firms surveyed. A list of all respondents' names and websites (if any) is attached.

Companies Participating in Survey of Alibaba B2B Website Users

China Yangzhou Weiteli Motor-Manufacturing Co., Ltd.	Green Source International Group	Belgraver Asia Pte. Ltd.
Tianjin Printronics Circuit Corp.	Wellmade Industry Corp., Ltd.	W. & J. Co., Ltd.
Horman Company	Zhejiang Light Industrial Products Import and Export Corp.	ChangZhou Rui Da Trading Company
China National Electric Wire and Cable I/E Corp. (Xiamen Branch)	iSquare Design and Development	Well Hung (Australia) Pte. Ltd.
Hebei Xin Hua Li Da Sale Department	Shandong Xingfa Foodstuffs	Renaissance International
K.O.G. International Philippines., Inc.	Mideast Mercantile Ltd.	Wuhan Zhongbai Group Co., Ltd.
Jiangxi Wire and Cable General Factory	Xiamen Zhongxin Metal Products Co., Ltd.	CNACC International Co., Ltd.
Young Eak Trading Co., Ltd.	Cintel International	Fujian Coal Import and Export Corp.
Shenzhen Tonghaisheng Investment Development Co., Ltd.	Sandstone International Co., Ltd.	Tung Kong Handbag Mfy
Jiangsu I/E (Group) Corp. (Heiteng Co., Ltd.)	Shanghai Yang Ning International Trading Co., Ltd.	Ambp Enterprises Co., Ltd.
Sinochem Hebei (Shenzhen Toomly) Import and Export Co., Ltd.	Pacific Silk Route Pte.	Software International
Zhejiang Yongkang Crown Power Tools Manufacturing Co., Ltd.	China Shaanxi Techrun Technology Company	Xiamen Gemachieve Enterprise
Truly Sales Co.	Praphan Ceramica Co., Ltd.	Shandong Metals and Minerals Import and Export Corp.
Hongguang Electronics Import and Export Co. (Guangzhou Office)	China Tea Import and Export Corp.	D.P. International
Chengdu Guoxin Maida Electronic Co., Ltd.	Hebei Sanli Cashmere Products Co., Ltd.	Jitco Group Ltd.
Catic Electronics	Yixing Tanghan Ceramic Co., Ltd.	Beijing Orient Sotoma Garment Co., Ltd.
H2O Electronics Co.	Xiamen Zhenhua Ind. Corp.	Ishida Co., Ltd.
Dong Young International Corp.	Ningbo Economic and Technical Development Zone Import and Export Corp.	Ningbo Free Trade Zone Sino-Dubai International Trading Co., Ltd.
Sinoleather.com Ltd.	Starscom Info-Tech Co., Ltd.	Shriya Impex
Chew The World	Seanet RS	Regan (H. K.) Ltd.
Gusung Machinery	Cixi Kaida Bearing Co., Ltd.	Citic Shanghai Import and Export Co., Ltd.
Eros Group	Kedi Hi-Tech Industrial Co., Ltd., Xiamen Office	Chengde Bearing Co., Ltd.
Xiangshui Bearing Accessory Co., Ltd.	Shijiazhuang Gulf Semiconductor Co., Ltd.	Manray Concept
Shandong Gifts and Decorations Import and Export Corp.	Tao's Inc.	Atul Exports
Dalian F.T.Z. Zhengxing International Trading Co., Ltd.	Feidong Foreign Economics and Trade Corp.	W. H. Enterprises
Yuyao Kingfan Industry and Trade Co., Ltd.	China Dalian Aidi International Trade Company	Guangdong Yangchun Bearing Co. Ltd.
	Aurora Translation Services	S.L.S. Partnership
	Cixi Fuda Bearing Co., Ltd.	Adore International
	Hanbit Ebenezet	Dorly International Enterprises Inc.
	Shen Zhen Xinhaowei Industrial Co., Ltd.	Shandong Commercial Group Corporation
	G.K. Trading Corp.	Goldsense Technology Ltd.
	Giga Technology Co., Ltd.	CV RJR International
	On Time Taiwan Ltd.	
	Suzhou Arts and Crafts I/E Corp.	