5 THE IMPACT OF INFORMATION TECHNOLOGY ON TRADE IN SERVICES

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Late last year, the Chicago Mercantile Exchange and the Singapore stock exchange announced the establishment of an electronic hook-up between the two exchanges that will permit global trading around the clock, twenty-four hours a day.

U.S. judicial opinions are abstracted and entered into an electronic data base in Korea, kept on file in Mead Data Central's computers in the United States, and are accessible via electronic hook-up by lawyers in London, Paris, or Dubuque.

A worldwide network of computers and communication circuits enables Bechtel to coordinate the activities of engineers in India, project managers in San Francisco, and construction supervisors on site in Saudi Arabia.

Citibank's system enables corporate treasurers to monitor checking account balances in Citibank branches around the world.

These four examples illustrate how the introduction of new computer and communication technology has opened up new trade opportunities in services. It is now possible to trade almost any type of service that can be delivered electronically, including data processing, computer programming, video and audio entertainment, training and education, legal services, accounting, engineering, banking, insurance, research and development, publishing, advertising and public relations, and communication and information services. International trade in services is estimated to exceed $600 billion annually.

The dynamism and potential for trade in services is an extension of the role services play in the domestic economy. In the first section, we will give an overview of services in our economy and explain the rapid growth in demand for information services. Then, in the second section, we will explore five key developments in the application of information technology that account for new trade opportunities in the services field. These may be summarized in the following way:

- Advances in microelectronics have reduced the cost, increased the speed, and improved the reliability of data storage and communications, thereby making trade in information based services a viable economic activity.
- The use of communications technology has led to the creation of new products and services that increase the possibilities for international trade.
- The use of communications technology has given rise to new production processes requiring substantial service inputs, thereby increasing the demand for internationally traded services.
- The use of communications technology by multinational corporations has allowed services to be provided on a worldwide basis, leading to greater efficiencies and specialization in services trade.
- The emergence of international networks has created new possibilities for trade in services by creating a mechanism for pooling and sharing information.

We will conclude this paper with some thoughts on what can be done, in terms of trade policy, to assure that the new trading opportunities brought about by technological advances in communication and information are not restricted by trade barriers.

GROWTH OF SERVICES IN THE ECONOMY

Year after year, data released by the government shows the accelerated growth of service jobs in the economy. Since 1960, the percentage of nonagricultural employment engaged in service activities has grown from 62 to 72 percent. Not only has there been a fundamental shift away from manufacturing and into services, but the service sector continues to provide significant job opportunities. Over the past two decades, some 86 percent of job growth in the economy has been in the service-producing

sector. During the 1970s, close to 90 percent of the 19 million new jobs created in the United States were white collar rather than blue collar. This trend continued through the recession of the early 1980s. Since December 1982, the bottom of the recession, 69 percent of the new jobs created in our economy are in service industries (CEA 1985).

At the end of 1983, over 53 million Americans were employed in service industries, excluding government. Of these 9.5 percent were in transport services; 10.1 percent in wholesale services; 10.4 percent in finance, insurance, and real estate; 30.8 in retail services; and 37.6 percent in a general category called services. From the point of view of trade in services, this latter category is most significant because it contains the business-related services of communications and information, data processing, accounting, law, advertising and public relations, equipment rental and leasing, and management consulting. In 1983 alone, over 240,000 jobs were created per month in these business-related services. All are highly dependent on applications of modern information technology and have thus been affected the most by changing technology (CEA 1985).

The employment boom generated by the introduction of information technology is not limited to service firms but extends to manufacturing firms as well. Firms primarily engaged in the production of goods use information technology extensively to provide in-house services, such as accounting, data processing, and financial management. In some cases, the services provided in-house have become so specialized that the parent company has created separate profit centers to take advantage of the expertise in particular service sectors. A good example of this is the McDonnell Douglas Corporation, which developed a data base for its internal research and development activities and now has a separate subsidiary that sells on-line data services to the general public throughout the world. McDonnell Douglas, a traditional manufacturing firm, thus is now also an international services business.

Services employment within manufacturing firms accounts for a large portion of the continuing growth in white collar employment in the United States. However, under the current data collection methodology, revenues generated by services operations within manufacturing firms are counted as part of the broad manufacturing category. Consequently, the data actually underestimates the full extent of services employment.

The traditional distinctions between manufacturing and services employment are blurred because information technology has dramatically altered the way manufacturing and services firms do business and

the kinds of business they perform. RCA was recently reclassified as a services company, after having been counted in the past as a manufacturing company; and IBM is beginning to ask itself whether it is primarily a manufacturing company or an information services company. While seemingly unimportant, such categorization directly affects the type of data that is collected and our ability to quantify the true value of services in our economy.

Even without perfect data, the importance and dynamism of the U.S. service economy is clear. Modern communications technology has led to the growing use of knowledge and information as inputs into the production of goods, as well as the production of other services. On the goods side, less labor is used in the physical production of goods and more labor is used in the processing of information supporting the production of goods. As factories automate, they need fewer workers on the assembly lines, but more workers to program computers and to design the robots. Moreover, as goods produced are more technologically complex, a larger amount of resources must be devoted to research and development, planning and marketing.

Similarly on the services side, there has been a shift from blue collar employoment, involved with the physical production of services, to white collar employment, involved with handling information. Information technology has made possible new types of services. There are numerous examples. Air reservation systems have facilitated international air travel. Computer monitoring systems enable transportation companies to trace individual shipments from point of origin to final destination. Computer and information handling systems allow retailers to store large amounts of information about potential customers and to direct marketing efforts to likely buyers.

The impact of information technology on trade in services is significant. It has made trade in many services possible, practical, and more efficient. Information technology has revolutionized the international banking industry, making it possible not only to collect and exchange massive amounts of financial data, but also to transfer money instantaneously and trade in foreign exchange. In large part, information technology is responsible for the growth of the Eurodollar market. Similar transformations have occurred in the insurance, data processing, and construction/engineering industries. In the following section we discuss five developments that help explain the significant impact of information technology on trade in services.

Information Technology Has Improved the Delivery of Information-based Services

With the advent of computer-to-computer communications technology, the traditional concepts of time and distance have less meaning. Satellite and fiber optic cable technology make it possible to transmit information instantaneously. It makes little difference where in the world the buyer and seller or user and provider of electronically coded information are located. Advances in communications technology and information storage and processing have made it possible to produce services in one place and to consume them somewhere else, and to produce services at one point in time (during working hours in Dallas) and to consume them at a later point in time (during working hours in Riyadh).

Before the advent of modern communications technology, most services had to be produced where they were consumed. The production of business services, for example, was highly dependent on timely information inputs and outputs, and this made geographic proximity necesssary. Most business services had to be performed where the manufacturing took place. With modern communications and data storage and processing, however, it is possible to receive and deliver information instantly over great distances, and this means that the two activities can be separated geographically.

Furthermore, technological advances have been so great in recent years that the cost of communications is declining in real terms. The cost for a typical international voice or telex message was $3 per minute in 1970; today the cost is only a few cents (Spero 1985). Beyond a certain point, the cost of transmission does not increase with greater distance. Communication technology has progressed to the point where 64 kilobits of information can be transmitted per second with complete reliability. In the very near future, computer-communication links are expected to operate at 1.5 megabits per second.

At the same time, the technical capacities of computer-to-computer communications have risen sharply. Increased computer power has made possible major advances in computer-aided design, information storage and retrieval, electronic banking, and hundreds of other computer-based services. Any service product that can be reduced to electronically coded bits of information can be delivered to any point in the world, with great reliability, at relatively little cost and with no time lag.

The operation of a construction/engineering firm provides an illustration of the way a firm can tie together its activities through the use of information technology. With modern information technology at its disposal, the San Francisco-based Bechtel company can determine the most efficient allocation of resources to gain economies of scale. Applications of information technology allow it to better manage equipment, people, and shipping schedules to minimize the idling of resources while waiting for missing inputs. The company can take advantage of differential labor costs by employing less expensive architects in India to draft construction plans, which become instantaneously available to supervisors in one corner of the world and project managers in another. Bechtel can use up-to-the-minute financial information to get the best financing rates from New York banks and insurance from a London company. It can then manage the construction of the project in the middle of Saudi Arabia by using Korean workers, Indian architects, American managers, and European materials. Computer communications makes it all possible.

Information Technology Facilitates the Creation of New Products and Services

As it has become cheaper, faster, and more efficient to store information and to transmit information electronically, both manufacturing and service industries have taken advantage of the economies of scale made possible by the centralized production and electronic distribution of services.

Modern information technology has made it possible for banks to take advantage of economies of scale by centralizing information resources in areas such as foreign currency trading or economic forecasting on a global scale. The collection of information from a wide variety of sources in one place allows banks to provide a broad range of financial information to their customers. Without information technology, this material might not have existed in the first place, might not have been available in a useable form, or might not have been cost efficient to provide to all consumers.

In other cases, it has become more efficient to distribute the production of specialized services, while centralizing access to the total pool of services. For example, data base vendors have distributed the development and maintenance of data bases covering various fields of knowledge

among many different geographic locations, while offering users centralized access. Market-oriented specialization at home leads eventually to trade. Data processing centers that initially served a limited local market now service clients around the world on a twenty-four-hour basis, and utilization of large computer centers in the United States shifts from one continent to another as users in different time zones start their work day.

Information Technology Has Led to the Development of New Production Processes

The introduction of modern communications and information technology has revolutionized manufacturing processes. More automated forms of production require less input of physical labor and materials and more input of information and knowledge. The result has been a sharp increase in the demand for professional services by scientists, engineers, designers, computer programmers, and managers, relative to the demand for blue collar labor. The end product, be it a car, television set or computer, contains more information and knowledge inputs than was the case in the past.

The American automobile industry offers a prime illustration of the way in which modern technology has revolutionized production processes. GM plans to invest $5 billion in a highly integrated manufacturing and assembly complex to produce a new, innovative small car called the Saturn. The complex will be designed to take advantage of the latest information and data processing technologies. A big part of the design work will be done by Electronic Data Systems Corporation, the Texas computer company that GM acquired for $2.5 billion last year. Computer hardware and software are expected to make up 40 percent of Saturn's total cost (General Motors/Saturn 1985).

Information technology's role in manufacturing is not limited to the production process. It plays a key role in the marketing and delivery of products. Moreover, most technologically sophisticated products require a stream of supportive services over the lifetime of the product. Often, such products can be sold only "bundled" together with the necessary supportive services in a single package. International trade in services has thus become inextricably linked to trade in goods.

The concept of bundling is clearly illustrated by the sale of computers. Twenty years ago, roughly 80 percent of the price of a typical computer

package was hardware and 20 percent was in associated software. Today, this ratio is reversed. Only 20 percent of the price for a typical computer package today is related to the computer hardware, while 80 percent of the price is accounted for by such elements as:

1. *Software* to make the computer work
2. *Engineering services* to demonstrate how to use the computer and integrate it into any existing communications/information structure
3. *Systems consultant services* to ensure that the software suits the customer's needs and is appropriate for the hardware
4. *Training services* to explain how to operate the hardware
5. *On-going information services* to alert the consumer to new developments in the technology of the hardware and software or better ways to make use of the technology
6. *Maintenance* services to ensure the continued operation of the computer.[1]

Similarly, sophisticated industrial machinery and robots cannot be sold without engineering support, software, maintenance, and other supportive services. In fact, their sales are dependent on the provision of these supportive services. Increased exports of technologically sophisticated products thus leads to increases in trade in services. Any barriers to trade in such equipment can limit trade in the attendant services. Likewise, barriers to trade in software, engineering, or maintenance services, or other restrictions or limitations on services trade, can restrict trade in technologically sophisticated goods.

All of the new production processes made possible by applications of information technology create new demands for international trade in services. With the growing importance of business services to modern manufacturing processes, a manufacturing company that wants to be globally competitive needs to have access to the best service inputs available, whether at home or abroad. (This development has sharply increased international trade in business services.) The more important business services have become for efficient production, the more trade in services has grown.

Multinationals and Services Trade: The Importance of Information Technology

The growth in the number of multinational corporations and the increase in the scope of their activities has prompted a sharp rise in demand

for services that can be provided on a global basis. Multinational firms find it more efficient to purchase services such as insurance or accounting from companies that can deliver the service globally and assure uniform quality, rather than by contracting with numerous suppliers around the world. Service firms have thus been quick to follow American multinational manufacturing corporations into foreign markets to serve their global needs. Once such service firms establish themselves abroad in support of their American clients, they tend to expand the scope of their activities to foreign clients. Trade in services has therefore been a natural outgrowth of the establishment of U.S. manufacturing subsidiaries abroad.

Multinational corporations make significant use of information technology on a global basis. The Organization for Economic Cooperation and Development (OECD) conducted a survey of some 200 international manufacturing and service firms from ten countries in 1982–83, in an attempt to describe the use and effect of information technology (OECD 1983). According to the firms surveyed by the OECD, the following production functions are handled through the use of information technology:

1. *Production control*, illustrated by the growth in robotics and computer-assisted manufacturing
2. *Research*, in particular the coordination of functions among research divisions or improve information resources available to staff
3. *Design/engineering*, as seen with computer-aided design, for example
4. *Marketing*, especially for transmitting information about local conditions, enabling direct ordering and arrangements for credit
5. *Distribution*, including scheduling, routing, and producing required transport or export documentation
6. *Order processing*, to tie together interdependent production facilities and eliminate unnecessary duplication
7. *Maintenance*, such as to track after-sales defects and maintenance histories and provide useful information to product designers.

Equally significant applications have been efforts to improve the internal management processes of firms through greater centralization of certain managerial support functions. According to the survey, the most important applications are in the following areas:

1. *Financial reporting and consolidation*, in particular to standardize firms' internal financial reporting
2. *Financial management*, such as for the central management of currency exposure or monitoring of credit risks
3. *Data processing*, either centralization or decentralization of this function depending on the firm
4. *Administration/clerical work*, including filing, maintenance of personnel records, bookkeeping, and, increasingly, message transfer.

As a result of the application of information technology, ordinary business activities of multinational companies have changed considerably. Multinationals have used information technology to improve global management and establish the basis for world product mandating. IBM's worldwide communications network, for example, enables it to introduce design changes in all of its manufacturing facilities on the same day. Similar facilities enable RCA to produce integrated circuits in one country, picture tubes in a second country, and to assemble the television sets in a third country.

The concepts of global management and world product mandating are equally applicable to multinational services firms that make use of information technology. Firms such as Bechtel, Citibank, Arthur Anderson, Arthur D. Little, AIG, and American Express can coordinate global operations, efficiently allocate resources, and instantaneously transmit information to ensure their competitiveness. These firms are at the forefront of the growth in international trade in services.

Multinational companies use information technology to "trade" services internationally in two distinct ways. First, they use communication channels to export and import internal managerial services such as accounting, financial reporting, and legal services from parent to subsidiary, subsidiary to subsidiary, or subsidiary to parent. Second, many multinational companies use these same communication channels to sell services to outside purchasers located in other countries. Thus, Boeing Computer Services sells data processing services performed in the United States to clients located in many parts of the world.

Modern information technology has also improved the efficient delivery of many services provided by and for smaller businesses and increased the demand for information services by households. We want and are supplied with more information about our financial transactions, about transportation possibilities, and about what is going on. We are also buying more entertainment services through cable television and video cassettes.

Networking

Applications of information technology and the tremendous growth in trade in services that it has generated has given rise to new systems, known as value-added communication networks, linking users and providers of information. Through a system encompassing computers, communications circuits, and input/output terminals, individuals at widely scattered locations can put information into the network and take information out of the network. Networking has fundamentally affected the way in which the U.S. economy functions and, by extension, the way in which the international economy will function in the future. Indeed, networks are at the heart of the post-industrial revolution.

While the common purpose is to share information, networks take different forms. Certain networks are interactive; that is, they allow the party accessing the information to add to the data base or make changes in information already stored. Other networks operate as one-way information streams.

Networks operate on three levels. First, *private networks* link individuals with common interests, allowing them to swap ideas and share information. On an intrafirm basis, private networks are used for internal corporate communications and can tie together laboratories, automated manufacturing plants, warehouses, and decisionmakers around the world. Second, *limited participation networks* facilitate the sharing of information specific to a certain industry. Third, *public networks* make available information to anyone willing to pay the access charges.

Private Networks. A number of multinational firms maintain private communications networks for internal corporate communications purposes to supplement public communications systems, such as international telephone service. Among the reasons for maintaining private networks are:

1. *Price*, particularly if the volume of transactions surpasses a certain level, economies of scale can be achieved
2. *Availability of service*, often an important factor for those firms doing business in parts of the world where communications facilities are substandard
3. *Control over system* to ensure faster response time or greater security than would be available through an industry or public network
4. *New business potential* of offering direct access to information and related information services not otherwise available to the general public.

Aside from internal communications functions, networks can serve a number of other purposes. One of these is credit authorizations. Companies that provide credit card services rely heavily on private networks to authorize purchases to prevent the use of lost or stolen cards and to prevent users from exceeding their credit limits. In addition, these companies use information technology to monitor their currency reserves, since they can have substantial cash flow problems. Future applications of information technology by such companies as VISA and MasterCard include billing and, possibly, the sale of economic information that they, like some banks, are already collecting for internal financial management.

Limited Participation Networks. Where it is economical to pool resources and cut costs of generating information of common interest to an industry, firms have grouped together on a global basis to develop industrywide networks. Access is restricted to members of the network, in many cases companies of the particular industry. Limited participation networks are widely used by firms involved in such technical services as oil exploration, where the cost of producing a data base on a company-by-company basis is extremely high. The largest users of this type of network are the airline and banking industries, both of which depend on large amounts of up-to-the-minute information in order to provide efficient, effective service.

Beginning in the late 1940s, the commercial airline industry began making extensive use of information technology to coordinate flight information. In 1947, a small group of airlines formed the Societe Internationale de Telecommunications Aeronautique (SITA), an association based in Paris that now has over 240 members. Through the SITA network, members share information about such diverse matters as seat assignment, identification of special dietary needs, credit card authorization, departure control, and meteorological information. In the future, SITA plans to expand the use of information technology to include cargo and baggage handling, flight planning, air-to-ground communications, and fare quotation services.[2]

The need for rapid and accurate information is crucial for the banking industry, as well. Information is vital to the ability of banks engaged in international business to respond quickly to changing market conditions. Yet, it is difficult for one bank, on its own, to acquire all of the international financial information it needs. There was thus a strong incentive for banks to join together in 1973 to form the London-

based Society for Worldwide Interbank Financial Telecommunications (SWIFT). Initial membership included 239 banks from fifteen countries. By 1979, 513 banks participated in the network, and by 1983, SWIFT had grown to 1,017 banks in forty-four countries. Over the same period, the number of daily messages carried by the system grew from 150,000 to 350,000. Working together, banks belonging to the SWIFT network have increased their information resources and reduced the cost of individual international financial transactions.[3].

Public Networks. Public data networks have proliferated at an astounding rate in recent years. Current estimates are that there are 2,400 on-line data bases in existence today, with hundreds more being added each month. At a cost between $5 and $75 an hour, an individual can connect his personal computer to telephone lines and access these data bases from any country with adequate communication facilities (Seligman 1985).

The traditional customers for on-line data bases were research librarians. Today, the major users are professional and business executives who will actually use the information in the course of their daily work. The amount of information available to them is astounding: everything from the latest medical research on parasitic diseases, commodity futures quotations, biographies of nineteenth Century French female poets, and an individual's checking account balance.

The largest data base is Dialog Information Services, a subsidiary of Lockheed, which offers subscribers access to over 200 data bases and plans to add thirty each year in the near future. The present collection contains over 100 million records, with citations to articles in 10,000 different journals. The largest sample of media databases is maintained by Nexis, one of Mead Data Central's products, which contains the full texts of new stories and articles from the major wire services, ten newspapers, and forty-eight magazines, among other items. The list goes on and on.

The emergence of international networks and global access to wide-ranging information resources reflects a growing interdependence of worldwide economic activity. The importance of networking from an international trade perspective is that it provides an efficient channel for trade in services. Bechtel's use of information technology to tie together its far-flung operations represents international trade in engineering, consulting and management services. Citibank's use of information technology to link its global branches to corporate treasurers

results in international trade in financial information services. Lockheed's use of information technology to provide access to data bases represents still another type of trade in information services.

THE ROLE FOR TRADE POLICY

Just as information technology has dramatically affected the production of goods and services and the operation of multinational firms, it has also created new issues of concern to trade policymakers. Trade policymakers have been confronted with questions such as the right to plug equipment into a communications network, the use of networks to deliver services, the transfer of information across borders, and access to information stored in foreign computers. Information technology has given a new dimension to trade policy.

To a large extent, the future competitiveness of both manufacturing and service firms will depend on access to the latest telecommunications equipment and information networks as distribution systems for the electronic delivery of information products or services. Trade policy can be a useful tool in ensuring that business opportunities are not lost because of discriminatory government restrictions in these areas.

Questions regarding barriers to trade in up-to-date telecommunications equipment and services are very much at the forefront of U.S. government concerns about foreign trade restrictions. Such concerns are frequently the subject of bilateral trade consultations. Over the past year, we have addressed a broad range of issues in this area, including the restrictive effects of computer decrees in Mexico and the Republic of Korea, informatics legislation in Brazil, policies concerning purchases of telecommunications equipment by NTT, the Japanese telecommunications monopoly, and regulations by Bundespost, the German telecommunications monopoly. Trade in telecommunications equipment is also being discussed in the General Agreement on Tariffs and Trade (GATT), the international trade organization. The current review of the GATT Government Procurement Code, for example, will include a discussion of procurement practices by telecommunications monopolies.

Trade policy officials have also been drawn into discussions on the establishment of value added communication networks (e.g., in Japan), and the right to use such networks for the delivery of services (Japan and Germany). The business community has also expressed concern about new regulations being considered by various foreign authorities that could hamper international flows of intercorporate, intracorporate,

or private data. In light of these concerns, the United States proposed in 1982 that the twenty-four developed countries of the OECD adopt a political-level commitment to minimize barriers to the flow of information. The proposal was patterned after the Trade Pledge adopted by OECD countries in 1974, which was designed to minimize the use of trade barriers in solving trade problems created by the oil crisis. Such a "data declaration"—now known as the "Declaration on Transborder Data Flows"—was adopted by OECD ministers in April 1985 at their annual meeting. It commits OECD governments to minimize barriers to the international flow of data and to develop cooperative solutions to any problems created by the introduction of new communications and data processing technologies (OECD 1985).

A third set of issues that has been addressed through trade policy channels concerns policy measures that limit the range of telecommunications equipment that can be plugged into international communications systems. Some government communications monopolies have restricted the ability of users to connect input and output devices to the communications network. While governments should have the sovereign right to assure that equipment plugged into the system does not adversely affect the system, if such actions are taken for the admitted or unadmitted purpose of limiting the sale of foreign services or equipment, then trade policy questions arise. A number of countries have been negotiating a so-called Interconnect Agreement under the auspices of the GATT, which would establish new rules in this area.

The current international trading rules of the GATT do not apply to services issues in general, nor do they deal with many of the specific trade problems cited above. To rectify this situation and lay the groundwork for the future expansion of trade in services, the United States has proposed that the GATT initiate negotiation of a framework of contractually binding rules and principles that will help liberalize trade in all service sectors. The framework would facilitate the reduction of trade barriers by establishing a set of groundrules for addressing trade problems through bilateral consultation and multilateral negotiations.

The following principles might be included in a framework agreement on services:

- *Transparency:* Laws and regulations whose purpose it is to protect domestic services industries would be notified by the parties to the agreement with the opportunities for cross-notification by other countries who view certain provisions as trade distortive.

- *National Treatment:* All parties to the agreement would assume the obligation of national treatment for those laws and regulations not notified as barriers or any future rules that would be implemented.
- *Due Process:* Countries would assure that new laws and regulations applying to services are made public with the opportunity for comments by interested parties prior to their implementation.
- *Public Monopolies:* A public monopoly involved in the provision of services would adopt an arms-length relationship between its own monopoly activities and its activities as an international competitor, a competitor domestically in other services, and as a supplier of services.
- *Dispute Settlement:* Provision would be made for dispute settlement procedures, including consultation and compensation.
- *Subsequent Commitments:* Procedures would be established for the negotiation of subsequent commitments dealing with the reduction of trade barriers, including provisions laying out these commitments and the re-balancing of concessions made.

Negotiation of an umbrella agreement would be followed, at a later stage, by negotiations designed to reduce existing barriers to trade in individual service sectors (Office of the U.S. Trade Representative 1983).

CONCLUSION

Growth prospects for the domestic service economy and for international services trade rely on the continued availability of modern communications technology and access to information resources and delivery systems. Trade policy can help ensure future growth prospects by addressing specific barriers that limit services trade opportunities and by formulating general principles, rules and procedures to govern international services trade in the future.

NOTES

1. Drawn from interviews between the authors and private sector representatives, 1984–85.
2. Based on discussions between the author and members of the Societe Internationale de Telecommunications Aeronautique, 1984–1985.
3. Based on discussions between the authors and U.S. member banks of SWIFT, 1984.

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DISCUSSION OF CHAPTER 5

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Feketekuty-Hauser offer clear illustrations of a variety of impacts of new forms of information-based international trade in the services. These diverse impacts include at least four major ones. The first three are generally familiar and significantly interrelated; only their dimensions are new to us. The fourth impact raises disturbing issues largely because of its novelty.

First, the *range* of tradeables has been expanded enormously. Today, research and development, data processing, and the whole panoply of services tied to expertise of one type or another—for example, management, legal, and financial services—are able to be traded in international markets.[1] Second, new technologies have expanded the *scale* of trade relationships so dramatically as to eliminate what once appeared to be "natural" barriers to long-distance trade. Twenty-four-hour trading illustrates clearly the way in which the constraints imposed by older time-distance relationships are being swept aside; the work day and work week are losing their ability to organize economic activity as new applications of existing technology wring the diurnal cycle out of services trade. Third, the *speed* of trade has increased dramatically as the exchange of new services now piggybacks on the speed of light. And finally, the *reach* of new technologies and their new combinations challenges traditional conceptions of privacy and accessibility. As data bases proliferate, files can be easily merged to

reconstruct increasingly fleshed out profiles of individuals, firms, and other units of analysis. This data pooling capacity poses as yet poorly understood threats to our traditional conceptions of privacy, freedom, and property rights. The rapid development of such synthetic data bases for commercial reasons raises further issues concerning restricted access to proprietary information sources for examination of public interest issues.

Together, these impacts lend proportions to information-based services trade that have the power to intimidate. There is broad agreement that something that expansive, that telescopic as well as microscopic, that disregarding of time and space must be a threat! But is it necessary to view the newest form of information-based services trade as a species apart? Probably not. It may be worth reminding ourselves of the many important ways in which what we are experiencing is really not a radical departure from what we have known for a long time.

REWIRING INDUSTRIAL PROCESSES AND PLACES

The rise of information-based services trade represents at best simply one—and perhaps not the most consequential—form of adjustment to ongoing industrial change. From this perspective, much-heralded new information technologies can be viewed as simply reinforcing a number of ongoing advanced industrial developments. First, the new services trade illustrates the continued mechanization of services. Increasing capital intensity, dependence on special labor inputs, and the rise of new markets near and far indicate a growing interdependence, rather than an antagonism, between goods and services production. The reconstructed and rewired central business districts that have sprung up in major cities around the nation since the late 1970s offer a physical illustration of changing ways in which the "city" itself serves as a production technology—and not simply as a situs for other technologies—for an evolving industrial economy.

Second, the corporation itself is a form of technology that has adapted to a global economy through the rise of multilocational/multinational firms. The significance of this development rivals—and predates—that of the diffusion of computer-based communication technologies. As a result, new products, new markets, and even new capacities for production itself dispersed, thereby bringing entire regions into the industrial mainstream.

I come from the South, which has long been viewed as the land of branch plants and inferiority complexes, and I cannot resist noting that the new trade in the services evokes the long-familiar issue of the "extended workbench" that, at the regional level, has been accompanied by the persistent concern that ever greater portions of industrial activity would be siphoned off to the South and West. This search for lower labor cost environments was expected seriously to undercut our industrial core regions. Increasingly extended and complex production arrangements since before World War II have indeed transformed the South dramatically into what today is the locus of the bulk of the nation's total output, manufacturing, and population. What was once a remote low-cost production platform for the industrial North and Midwest is now recognized as an arc of regional economies capable of incubating the greatest part of their new industrial development rather than being dependent on spinoffs from other regions.

In this context, the impacts of new information technologies may be as much the consequence of larger changes in the economy as the cause of them. For example, today Dallas hosts perhaps the world's largest cluster of telecommunications firms, a large and rapidly expanding computer software and data processing services complex, and the third largest and fastest growing high-technology sector in the United States. This capacity has been developing all through the post–World War II period, and today the bulk of the resulting employment is tied to older and larger firms. Places like Dallas have developed into industrial assets rather than simply industrial appendages.

MAGNIFYING THE ROLE OF SMALL BUSINESS

Advanced industrial development not only broadens the industrial base in a geographic sense, but also amplifies the contributions of firms whose size was once a major impediment to the scale and scope of their activities. Information technologies permit even the newest and smallest of businesses to participate in a global economy. Using Texas as an example again, a third of the Dallas area's high-tech firms have been established during the 1980s alone. Yet, a fifth of these firms have an explicit international trade orientation (see Table 5D–1). While this tendency appears to be less pronounced in the business services (SIC 73) in general, a growing body of research indicates that the expanded scale of new small firms in selected high-tech service sectors such as

Table 5D–1. International Export Orientation of High-technology Firms in the Dallas–Forth Worth Regional Economy.

Sic	Industry	Total Number of Firms	Number of Exporting Firms	Percent Exporting
28	Chemical and allied products	15 (1.9%)	1	6.7%
35	Non-electrical machinery	20 (2.5)	4	20.0
36	Electrical and electronic equipment	222 (28.1)	59	26.6
37	Transportation equipment	8 (1.0)	3	37.5
38	Instruments and related products	156 (19.8)	60	38.5
73	Business services	369 (47.7)	31	8.4
	TOTAL	790 (100.0%)	158	20.0%

Source: Hicks and Stolberg (1984).

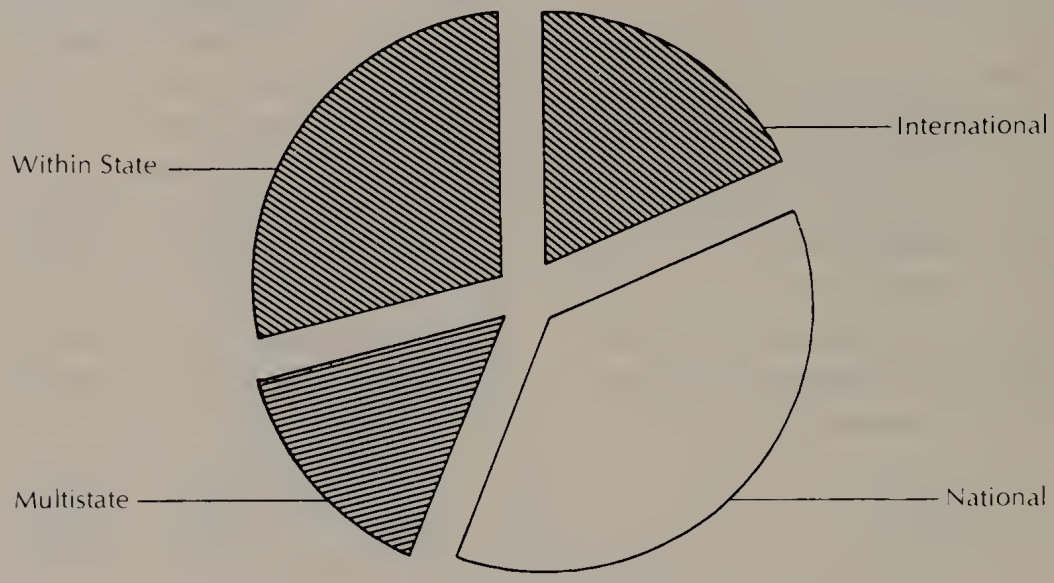
computer services (SIC 737) is increasingly commonplace. Figure 5D–1 reports that nearly one fifth of the computer services firms in the state of Texas report international target markets for their major product.

NATIONAL BORDERS AND INFORMATION-BASED TRADE

Information-based technologies and the trade they facilitate appear to be more evolutionary than revolutionary from this perspective. Given the rate and scale of the diffusion of the underlying technologies, the resulting trade is invisible and instantaneous. Consequently, it is also regarded as disorderly. Existing trade balances, statuses, and relationships become volatile and unenforceable viewed from the perspective of nation-states. As a result, policy questions arise that revolve around how to define comparative advantages in information-based services trade. Once defined, how do we maintain them? And what are the distortions in trade resulting from protectionist impulses?

While the adjustment difficulties of national governments are predictable, they are not to be discounted or casually dismissed. Rapid diffusion of technology can lead to a climate in which ongoing investment in

Figure 5D–1. Computer Software and Data Processing Services (SIC 737): Target Market for Major Product.



Largely within state	28.8%
Multistate (largely regional)	15.0%
Largely national	37.5%
Largely international	18.8%

Source: Hicks (1984).

innovations can be inhibited. Accelerated product cycles can undercut the expected returns on research and development by industry so drastically that new investment may be dampened. When the products are intangible and able to be traded globally via information flows, the result can look like disorder. What balance can be struck between maintaining our competitive advantages in information-based services trade without imposing explicit or subtle barriers either to that trade or to the continued development and application of technologies on which this trade is based? Perhaps there are useful insights to be gained by examining early international exchanges involving innovations in goods production more than a century ago.

LESSONS FROM THE PAST?

In the mid-nineteenth century, we were the Japan of our day, depending heavily on rapid adoption and imitation. In London in 1851, the

Crystal Palace was set up by Queen Victoria and Prince Albert to showcase state-of-the-art manufactures in the wake of industrialization. Americans were eager visitors. Two years later in 1853, the Crystal Palace in New York City attracted a British delegation to study what looked to them to be "the American system of manufactures." They were evidently blind to the fact that much of what they saw was borrowed from Europe originally! The factory system, interchangeable parts, and the division of labor constituted the new industrial infrastructure of this mass production revolution.[2] The key to our success with mechanized production was the widespread application to a variety of industries. It was this early "trade" in ideas that led to the subsequent explosion of goods production in the United States. As was to be the case at the interregional level a century later, the industrial development of the United States did not come at the expense of the industrializing nations of Europe as much as it was a healthy extension of it.

DISTINGUISHING TECHNOLOGY DIFFUSION FROM INNOVATION

Today, it is widely noted that our competitive advantages lie more in our capacity to innovate than in the trade that flows from innovation, yet this may be only partly true. In information-based services trade, just as in the early development of a goods production capacity, comparative advantages hinge on the pace and range of new applications of existing technologies. The capacity to spur diffusion may be every bit as imporant as the fostering of innovation.

In several important respects, new forms of services trade are not as novel or unfamiliar as they are often portrayed. Indeed, we have always had an information-based services economy. Originally, the linking technologies of transportation and communication were inevitably combined. It was not until the rise of the pure communication technologies during the nineteenth century that the message could be sent without the messenger. Yet, the marvelous and even awesome impacts of technology that so command our attention today are more wisely regarded as reflections of their diffusion, rather than their innovation.

In recent decades, it has been the *diffusion* of new communication capabilities throughout the economy that arguably has been at least as important to the rise of information-based goods and services production as have been new technological innovations themselves. The wider application of telecommunications to new industries, the resulting

integration via "networking," and the synergy provided by feedback from consumers are principally the consequences of this widespread diffusion. That this capacity now permits transborder services flows may have the larger impact of broadening the base of advanced industrial economies throughout the world.

Nations must retain the capacity and incentives for creative application and commercialization of existing technologies. And that process may be greatly impeded by attempting to make new forms of information-based trade abide now largely irrelevant national borders. In the end, the innovations that result in tomorrow's technologies and trade are rooted in today's open exposure to new ideas and demands. Continued efforts to negotiate a free and open trade environment in information-based services probably offer the best opportunity for the gains made by our trading partners to supplement, rather than supplant, our own.[3]

NOTES

1. Nevertheless, this expansion has been accompanied by a declining trade surplus in services as well as a modest contraction in the U.S. share of world services trade in recent years. As Shelp has correctly noted, however, recent efforts to identify and negotiate the dismantling of barriers to services trade abroad do not obviate the need to allocate greater resources to vigorous export promotion of services. See Shelp (1984).
2. For a series of excellent discussions of the ways in which new technological capacities shaped early goods production in the United States, see Mayr and Post (1981).
3. To a considerable extent, frustration with the fact that other nations are exploiting our policy of open services trade has not led to increased support among major U.S. services firms for retaliation or the adoption of restrictive trade policies by the United States. For the results of a 1983 Price Waterhouse survey of 220 companies from among the Fortune Services 500 companies having foreign operations, see "Business Views on International Trade in the Services" (1984).

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DISCUSSION OF CHAPTER 5

Gérard Pogorel

New information and communication technologies (NICT) are having a great impact on both the manufacturing and the service sectors of the world economy. New products have been created. Efficient management procedures are implemented, coordinating the activities of highly complex organizations (especially matrix form, which combines vertical and horizontal links). The new technology calls into question the division between markets and hierarchies, multinational enterprises (MNEs) and small businesses, large and small nations. The strategies of a few worldwide corporations promoting the use of NICT is assuming a major importance.

The information and communication sector, in particular, is undergoing an industrialization process that is characterized by differentiation and specialization. A division of labor is taking place that is international in scope. The process is capital intensive, substituting capital for labor. It is complementary to changes in production processes in manufacturing and favors the full-scale application of an efficient factor allocation.

WHAT ARE THE BEARINGS OF NICT IN THE PRESENT WORLD SITUATION?

NICT offers the world opportunities but are perceived by many countries as a major threat: These technologies can very easily bring changes

in the location of activities and losses in employment. The liberalization in the trade in goods has been accompanied by large flows of international investment. MNEs have relied, at least partially, on a strategy of local production. Whatever reactions may have arisen, employment opportunities are still a strong argument for governments to invite foreign companies to establish themselves and gain access to more or less protected markets. A local establishment and local jobs are no more necessary for service activities using NICT. A representative of an artists' and comedians' union once told me that screen actors are the only people who can watch themselves working while they are unemployed. Technology creates jobs, but where? In his book *Stolen Memories* an adviser to a French Minister of Industry noted that the economies of scale in existing data banks and related services might deprive all but a very few countries in the world of their own data storage and retrieval capacity (Lorenzi and LeBoucher 1978). The extended use of NICT in the service sector presents the possibility of a delocation process affecting many activities—science and technology, research and development, culture and information pertaining to the social and political system—that many countries consider essential parts of their very being.

These fears may be called into question. No such process is taking place for the moment. As for the cultural argument, it is often simply a disguise for preserving more mundane vested interests. Furthermore, the delocation of activities is no news in economics, and its outcome has often been positive.

The liberalization of trade in services depends on the international negotiations now underway at the GATT. There are many obstacles that will have to be overcome before these negotiations can promote an open and balanced international trade policy system. We will review some of these difficulties and offer an analysis of the attitudes held by some of those involved in the negotiations.

First, liberalization of trade in manufactures took place in a different time. New participants have now to be considered. Currently there are two categories of third world countries: the ones who are developing and all the others. Japan has asserted its position in the world economy. European countries are at a critical point. As a whole, the international economy is more multilateral than it used to be. International negotiating exercises are more complex. Protectionism in services exists at the outset and concerns markets that have long been considered national in their very nature. Although technological change renders this concept obsolete, longstanding attitudes are hard to overcome.

Second, we have to consider the present situation of comparative advantages. American companies have taken proper advantage of the opportunities with which history has provided them. In most sectors they have achieved a dimension unknown to their foreign counterparts. They have combined economies of scale and economies of scope to gain a competitive edge on the world market. Let us take an example on the telecommunications market. GTE Corporation is a relatively small competitor by U.S. standards, yet even before deregulation it had more subscribers than the German Bundespost and the French Telecoms Agency put together. Therefore, Americans and Europeans have opposite points of view. Americans are proud of their achievements, as they should be. They invite everyone to follow their lead and think in terms of market competition. Europeans think in terms of "cooperation" or organized technology transfer. They would like programs to be developed between companies on the European market before competition can take place. An example is the European Strategical Program in Information Technology (ESPRIT), which offers a 1.2 billion dollars community budget (in 1984) for sixty-six cooperative research programs. When high-technology imports from the United States or Japan cannot be avoided, Europeans would like joint ventures to ease their impact.

This may sound terribly heretical to some, especially to those economists trained to believe in the virtues of the marketplace. Yet, we must understand that Europeans perceive a renewed "technology gap," and they believe in the basic superiority of consciously determined social action as a rectifying agent over the uncertainties of the open sea.

This can be referred to as the peculiarity of comparative advantages in service and high-technology activities. They have no root in basic factor endowments (natural resources, cheap labor, or abundant capital). They belong to the category of "dynamic" comparative advantages, so that nearly every country hopes it might achieve such an advantage. This results in renewed advocacy for the infant industry argument, which means many "temporary" trade barriers.

Third, we have to face the fact that the short-term cost of protection in service is very low. We can approximate its order of magnitude by using the X-efficiency approach: The cost of monopolistic structures on any of the big consumer markets amounts to about 1 or 2 percent of the price of the service (Leibenstein 1981). Another measure of the cost is the moderate extra charge to telephone users imposed by a

monopoly. By both of these measures the order of magnitude is the same. These are not high costs to pay, especially if one believes that this protectionism contributes to the fulfillment of national objectives and to the preservation of the economic, social, and political order.

But these are only short-term considerations. Higher competition standards are not only meant to bring a 1 to 2 percent price advantage. There is the important long-term impact that the market structure has on the innovative process. Some countries are ready to pay, or have the taxpayers pay, for the flow of their national culture through the new channels.

Finally, countries and international trade policy systems are losing their resistance to sectional policy pressures. Many national economies are functioning, more or less, as generalized corporate systems. Economic sectors are acting as lobbies to protect themselves from foreign competition. Also, the people living in industrialized countries (with no exception) are acting as a kind of lobby to protect themselves from foreign manpower.

We may conclude on an optimistic note. There are a few hints that certain barriers are slowly breaking down. With the prospect of a way out of the world economic crisis, Europeans are gaining the confidence to make changes. In fact, change can be observed at the top levels of government and business. Leaders in Europe, and maybe elsewhere, know that a failure in promoting an open and balanced international trade policy system in the field of new information and communication technology would signal the end of the benefits of the international structure.

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DISCUSSION OF CHAPTER 5

Ronald Kent Shelp

The role of service industries in the development process is one of the most ignored economic questions of the twentieth century. Services have played second fiddle in economic thought to what many consider the more important elements of economic production—manufacturing and agriculture. It is no surprise, therefore, that service technologies have been ignored as well. In fact, the association of services with technology at all has only come about in recent years with the revolutionary advances in the new information technologies.

While there is neither a theoretical nor an empirical basis to support the conclusion that information technologies are essential for economic progress, fascination with these technologies has so captured public imagination that there is little argument that they are. Disagreement does arise, however, over the appropriate role of foreign suppliers of information technology in national development plans.

This fundamental issue is at the core of the current debate over establishing international rules within GATT (General Agreement on Tariffs and Trade) to govern service trade. While trade in information technology is only one aspect of these discussions, to many it is the most important.

TRADE RULES FOR SERVICES

The notion of establishing trade rules for services had its germination in the United States in the early 1970s when American service firms, confronted with a multitude of foreign barriers, began to demand help from government. One result was the inclusion of services in the Trade Act of 1974. Pressed by a coalition of service businesses—construction, airlines, insurance, travel services—Congress took an historic first in trade legislation when it extended most U.S. trade laws to services and urged the administration to negotiate international rules governing service trade.

This launched a twelve-year effort that first bore fruit in November 1984 when the GATT contracting parties established a working group to study services trade. The United States, as the leader of this effort, hopes this working party will conclude that service trade rules are needed. If the industrial nations launch a new round of trade negotiations in the next few years, the United States has demanded, with support from Japan and several European nations, that services be a principal concern in negotiations.

At first glance one wonders why services, a trading activity estimated by the London-based Committee on Invisible Exports to have reached $700 billion in world trade in 1983, is outside the international system of trading rules. One would assume this oversight would be relegated to the past and the fastest growing sector of international trade would be integrated now into the trading system. For several reasons this is not the case.

First, there is a basic conceptual problem with the subject of services trade. Not only has trade theory ignored services, but the broader subject of the economics of services itself has been ignored as well. Colin Clark (1957), the Australian economist, summed it up well when he said, "The economics of tertiary industries remain to be written. Many as yet feel uncomfortable at even admitting their existence."

If a theoretical understanding of service economics is nonexistent, little wonder none exists for service trade. Instead, discussions of service trade seem only to raise a series of tough, unresolvable issues. For example, since the consumer takes part in the production, how can the service be traded—that is, how can a service be produced in one country and consumed in another? Or, since a service cannot be stored, how can it be exported? And, even if some services can be traded, are there benefits from such trade?

In the case of goods and commodities, the theory of comparative advantage is widely accepted as rationalizing the benefits of trade, but there is no such agreement about trade in services. Many ask whether comparative advantage really applies. Even if it does, are not services so linked to other national concerns—cultural pride, national security, individual welfare—that it would be contrary to the national interest to permit them to be traded?

A second basic problem is the dismal lack of data on services trade. Even the United States' data on service trade, which is the best available, is totally inadequate. For example, government commissioned studies indicate that in 1980 United States' service exports ranged somewhere between $60 and $120 billion. Compounding the problem is the lack of disaggregation in the service data that does exist. There is general data by category, but sparse data on the individual industries within a category. Without this, it is very difficult to make decisions on the impact and the benefits of trade liberalization in services.

A third major issue is rooted in the fear of many nations that the United States has an overwhelming comparative advantage in service trade. After all, the United States is the first and largest service economy. The service sector employs 74 percent of the workforce (U.S. Dept. of Commerce 1984) and provides 67 percent of GNP (U.S. Dept. of Labor 1984). Most years, trade surpluses have offset merchandise deficits. The United States' aggressiveness in pushing for international trade negotiations on services has only reinforced these fears.

CHANGING VIEWS OF TRADING NATIONS

When the United States first suggested negotiating trade rules for services, she received little support from other nations. This situation has changed dramatically, especially in the European Community. At first the Community and its individual members were either hesitant or outright opposed to the suggestion that international trade rules for services were necessary. Even the United Kingdom, whose major export is services, showed little interest. This has changed as the Community and its members have come to understand their stake in services trade.

In 1983, the Commission of the European Communities conducted a study on the significance of service trade to both the Community and its member countries. Highlights of its findings were announced by Leslie Fielding, Director General for External Relations of the EC Commission,

in a speech in London in October 1983. Mr. Fielding said, "The European Community is the world's largest producer of services, accounting for 36 percent of world exports of services, three times as much as the United States."

Perhaps most startling of the Commission's findings was the fact that three members—France, Germany, and the United Kingdom—each have service exports approximating between 60 and 75 percent of U.S. service exports. The Commission study also discovered what the United States has long known: Services are vital to employment. Of the 19 million jobs created in the 1970s in the United States, 17 million, some 89 percent, were created by service industries (U.S. Dept. of Labor 1984). There has been similar service job creation in Europe, although it has not been as dramatic. Between 1973 and 1981, when 4 million manufacturing jobs were lost in the Community, 3.4 million new jobs were created in "market services"—that is, nongovernment services (Commission of the European Communities 1983).

These revelations have brought about a dramatic change in the views of the European Community. Now it supports "the need to examine the introduction of service trade into the international trading system of rules" (Commission of the European Communities 1983). Not all Community nations share this view. France continues to be opposed. One reason is that the European Community study was unable to determine what services (and what nations) would benefit from service trade liberalization.

Japan on the other hand has been supportive of the United States' position from the beginning. Prime Minister Nakasone was the first head of state to announce support for a service trade negotiation. Cynics attribute Japanese support to the strong pressure Japan has received to reduce its huge trade surplus with the United States and other countries. Since Japan has a deficit in service trade with the United States, it would be to her advantage to be generous in an area of weakness. Liberalization of service trade deflects attention from the merchandise deficit, according to the argument.

Whether this assertion is valid or not, the important point is that the Japanese are serious about services. Prime Minister Nakasone, speaking before the Japan society after the Williamsburg Summit in 1983, said one of Japan's most formidable problems was managing the transformation to a post-industrial economy.

Apparently, there is fierce competition within the Japanese government to address this issue. The Ministry of International Trade and

Investment (MITI), Ministry of Foreign Affairs, and the Japanese Planning Agency have all established service study groups. These agencies have led delegations of Japanese businessmen to the United States and Europe to study services trade. Clearly, Japan has concluded that services, especially information-based services, are high priority activities central to future competitiveness. She is preparing herself to compete in this sector as she prepared herself to compete in traditional and high-tech industries.

DEVELOPING COUNTRY OPPOSITION

Most developing countries have strongly resisted the effort to discuss international trade in services in the international organizations. Brazil has led the opposition with strong support from India. The reasons vary. Brazil has taken a traditional infant industry view towards services. She argues that indigenous service industries, like other industries, should be protected until they are able to compete with foreign service industries. India, which is not as strongly opposed to a services exercise as Brazil, is less precise about her concerns. There seems to be sympathy with the infant industry perspective, as well as a fear that the jobs now provided in India by services will be threatened with foreign competition. The Indians frankly admit that they do not know enough about the subject and that in-depth studies are necessary.

While Brazil and India have spearheaded the opposition to trade in services, with the sympathy of many other developing nations, this block is no more unified on this issue than on most others. Several actually are supportive of an effort to liberalize service trade. Hong Kong and Singapore are service economies already and have prospered through an open service environment. Nevertheless, no developing nation or regional group of developing countries has seen the issues defined in a way that leads them to go against the leadership of the newly industrialized nations like India and Brazil and fight forcefully for the inclusion of services on a GATT agenda.

SERVICE TRADE AND INFORMATION TECHNOLOGIES

While international dialogue about services trade has been underway for ten years, the subject of information technologies has only come to the

forefront of these discussions in the last few years. Until very recently the trade barriers faced by traditional service industries—banking, insurance, construction, engineering, transportation, travel, and professional services—have dominated the discussions. But the remarkable technological change that has occurred in recent years has brought about a shift in focus.

The world has become enamored of the new information technologies. Nations as different as France and Brazil have embraced a vision that holds the new technologies as the key to a prosperous future. Those who possess them will be rich and competitive. Those who do not will fall behind. While the term "new technologies" covers a broad range of economic activities, in the popular parlance, "information technologies" has become almost interchangeable with new technologies.

COMPETITIVENESS IN INFORMATION TECHNOLOGIES

While there is little dissent from the international consensus that securing the new information technologies is essential to the national interest of virtually every nation, there is division about the best way to attain these technologies. One view is that the best way to keep up with technological change is to maintain open markets. Countries that encourage the free flow of trade in the products and services related to information technologies are those likely to keep abreast of the latest advancements. Perhaps most characteristic of this philosophy is the United States, a nation having an admitted edge in these technologies.

The other view is that the best way to achieve a national goal of technology competitiveness is to undertake a massive indigenous effort to develop information technology industries. Inherent in this approach is the philosophy that while they are developing they must be protected from outside competition. This is, in other words, a variation of the classic infant industry approach. Brazil, the leading nation in opposition to examining service trade in GATT (or anywhere else), is an example of this attitude. She has implemented a strongly protectionist plan to encourage the development of her informatics sector.

While the developing world is not unified on which approach to take, most would find themselves taking an approach to development that has been characteristic of the developing world. A 1984 meeting of the Trade and Development Board of the United Nations Conference on Trade

and Development (UNCTAD) considered the broad subject of service trade for the first time. The Secretariat paper prepared for the meeting was a well researched, extensive, fairly dispassionate treatise on the subject. While it did not make basic policy choices between liberalization or protection, it did observe that services have a little understood role in the development process and recognized that the information revolution will make many previously nontraded services tradable. It also raised the specter of neocolonialism with the warning that transnational companies would be able to dominate service trade and relegate developing nations to the low-skilled aspects of data processing. So, by implication, it leaned towards the traditional approach.

FINDING THE BEST PATH

If there was a theoretical body of knowledge, supported by empirical evidence, that clearly demonstrated the advantages of liberalized trade in the information-based service technologies, it would be much easier to deal with this subject. Regretably, an examination of whether the principle of comparative advantage applies to trade in services, especially information services, has not been undertaken. For developing countries, such an examination must include the basic role of services in economic development.

Although the theoretical literature and empirical evidence is scant, some does exist. For example, the recent book *Service Industries in Economic Development—Case Studies in Technology Transfer* (Shelp et al. 1984) is an interesting examination of this subject, which looks at three companies, American International Group, Bechtel, and Sears, Roebuck and their activities in a variety of developing countries. The book draws some interesting conclusions about this long-ignored subject. It concludes that services play a very positive role in development, a role that has been not only misunderstood but overlooked. While the case studies in this book do not focus directly on the information technologies, clearly all three of these companies utilize these technologies.

More work of this nature must be carried out. I suspect the results of such studies will persuade the developing nations of the benefits of liberalized trade in services just as the European Community study persuaded them. More than likely, empirical research will support the thesis of Jagdish Bhagwati of Columbia University, who argues that the developing nations have a comparative advantage in what he calls the over-the-wire transmission of engineering, medical, legal and other services.

This theory can already be demonstrated by example. Lawyers in Korea receive a request from a New York affiliate in the United States to undertake legal research. Their findings are transmitted by means of a combination of computer and telecommunication technologies to a data base storage facility in the Midwest. From there, the information can be accessed by law firm affiliates in London and Milan.

Developing nations can benefit enormously from such activities. They introduce new technologies, create jobs, and generate revenue.

There is an irony here, however. As the developing nations come to appreciate the benefits of free flow of information and trade in the new information technologies, a counterreaction is likely to occur in the industrial countries, including those that today favor liberalization, such as the United States. As they begin to understand the potential "export of jobs" associated with these technologies, especially those associated with moving the back office function overseas, they may have second thoughts.

This is the price that has to be paid for maximizing the benefits of trade in anything, be it goods, commodities, or services. There are gains and losses on both sides. What at the moment looks like an overwhelming advantage for the United States, and perhaps a few other countries, may prove to be quite different in the long run.

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