Chapter 9

Foreign Government Policies

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Chapter 9

Foreign Government Policies

SUMMARY

Since the November *1982* Ministerial Meeting of the General Agreement on Tariffs and Trade (GATT), the United States has pressed for multilateral negotiations aimed at liberalizing services trade. As discussions continued, the prospective agenda broadened: services became the centerpiece of a group of "new issues" including foreign investment, trade in high-technology goods, intellectual property protection and anti-counterfeiting measures, and restrictions on transborder data flows. For a time, the U.S. proposals led some people to refer to the planned talks as a services round. Eventually the scope expanded still further, as the United States and other countries sought discussions on issues well-removed from services —e.g., agricultural trade, The preparatory process initiated at the *1982* Ministerial culminated 4 years later in agreement to begin the Uruguay Round, during which GATT members will discuss services for the first time. The 4-year schedule for the new round is an ambitious one; given the pace in such organizations, and the difficulties to be expected, inclusion of services within GATT codes before the middle to late *1990s* would be surprising.[1]

This chapter outlines government policies in major trading nations and developing countries in the context of the Uruguay Round. The focus is on policies toward the services as a group, to the extent that such policies exist. In fact, few governments have had active policies toward the services sides of their economies, preparations for the new round were dogged by controversy in part because few governments grasped what was at stake, and what they might have to gain. Resistance came at first from other industrialized countries, as well as the more industrialized developing countries—notably Brazil and India.

By the middle of *1986,* the rest of the industrialized world had lined up behind the U.S. position—which itself had shifted to de-emphasize services somewhat. But opposition by a group of about 10 developing countries remained firm, and has become, in effect, the beginning of their negotiating strategy. Opposition—which extends not only to services, but to the new issues generally—has been rooted in part in the economic development strategies pursued by these countries. Baldly stated, parts of the developing world also believe that anything the United States wants is likely to be bad for them. This chapter seeks to explain the opposition, while also reviewing policies in other countries that affect trade and competition in the services; among other purposes, such a review may suggest lessons for the United States —both policy approaches the Federal Government might emulate, and those it should avoid.

Several of the other new issues straddle the boundary between goods and services; the chapter treats them mostly as they relate to services trade, Investment restrictions, for example, have particular relevance because a foreign presence is needed for producing so many service products; the Uruguay Round participants will take up trade-related investment—meaning, most directly, performance requirements that set conditions (such as exporting some production) for direct investment. When it comes to trade in high technology, most of the questions revolve around subsidies and other aspects of national industrial policies. These touch particularly on the complex of

[1]On the C, ATT, see U.S. *Industrial Competitiveness: A Comparison of Steel, Electronics, and Automobiles* (Washington, DC: Office of Technology Assessment, July 1981), pp. 185-186. On the preceding Tokyo Round, U.S. trade law as it relates to merchandise, and U.S. trade policy in general, see *International Competitiveness in Electronics* (Washington, DC: Office of Technology Assessment, November 1983), ch. 11, especially pp. 430-438. For a discussion of national and international regulations covering trade in services, see R.K. Shelp, *Beyond industrialization: Ascendancy of the Global Service Economy (New* York: Praeger, 1981), chs. 5-7.

services associated with information processing, as do transborder data flow (TBDF) restrictions—which could also affect services like banking that depend heavily on international telecommunications. Intellectual property protection is particularly important for software and information services.

The Uruguay Round promises to be the most complex since the founding of GATT in 1947. The reasons begin with the loss of U.S. economic hegemony, which makes these talks more nearly a negotiation among equals than at any time in the past. Reaching agreements on services will be especially difficult because many service industries have traditionally been regulated by governments for domestic reasons (protection of consumers and investors in the case of banking and insurance) or operated as public monopolies (telecommunications). For governments wishing to protect their service industries, regulatory policies have provided convenient barriers to trade and investment. And lacking clean distinctions between trade policies and domestic policies, governments will, quite naturally, resist what they regard as interference in their domestic affairs.

GOVERNMENT POLICIES TOWARD THE SERVICES

Trade Policies and Domestic Policies

Table 45 distinguishes broadly between trade policies and policies that are primarily domestic but have implications for trade. The middle ground includes government organization, collection and analysis of statistical data, and taxation. (App. 10A, at the end of the next chapter, gives examples of the ways U.S. tax policy can affect competitiveness.) Many policies, regardless of category, affect competitiveness indirectly —i. e., by conditioning corporate decisions. The range of these indirect impacts extends to expectations of future policies; if managers think Congress may pass a tax bill this year, that expectation will influence their capital investment choices. Some of the policies listed in table 45—e.g., foreign investment controls—have been unimportant in the United States, though familiar tools elsewhere.

Of course domestic policies affect trade, while trade policies serve domestic purposes. The United States deregulated its telecommunications industry for domestic reasons, but this shift in policy has had widespread international ramifications. At the same time, governments may design regulatory policies to act as nontariff barriers (NTBs), particularly in industries like banking and insurance where it is easy to tilt the rules to give domestic firms an advantage. Table 45 simply imposes a nominal ordering on policies with possible impacts on trade and competition in the services.

Barriers to Trade and Investment

Any policy that discriminates against foreign suppliers except a simple tax on incoming goods or services constitutes a non-tariff barrier. When the French required all imported video-

Table 45.—Policies Affecting the Services

Primarily trade-related	Both trade and domestic imports	Nominally domestic but with impacts on trade
Nontariff trade barriers (NTBs)	Taxation (differential rates across sectors, R&D tax credits, etc.)	Technology policy (including R&D supports and subsidies, and technical standards)
Foreign investment controls	Data collection and analysis	Investment grants and subsidies
Export credits and subsidies (e.g., tied development aid)	Government organization	Procurement
Export promotion		Labor market and human resources policies
Export restrictions		Domestic regulation (including antitrust and competition policy)
		Intellectual property protection

SOURCE Off Ice of Technology Assessment. 1987

cassette recorders to enter through Poitiers, where they overwhelmed the small port-of-entry staff and backed up by the truck-load, France was imposing an NTB. An equally well-publicized example: Japan's use of product standards to keep out American-made baseball bats. Foreigners have said that U.S. product liability laws amount to NTBs. Some Americans make the same claim for Japan's vast and fragmented retail distribution system; the country has many more—but smaller—retail outlets per capita than Europe or the United States, with more layers of distribution to supply them. z Other NTBs include formal and informal quotas, implicit and explicit subsidies for domestic producers, and discriminatory government procurement practices (buy national requirements).

Given the nature of production in the services, most trade barriers will be non-tariff in nature (ch. 2). (The exceptions consist of service products with at least some of the characteristics of goods—e.g., computer software—so that shipments can be monitored at borders and duties assessed.) NTBs pose knotty problems for negotiators. Quotas and direct subsidies are visible, but other policies may be NTBs only in the eye of the beholder. Moreover, when it comes to implicit subsidies, or regulatory policies that treat, say, foreign banks differently from domestic banks, the impacts on trade may be uncertain. This makes it more difficult for governments to negotiate matching concessions. Trading tariff cuts on wheat for those on computer chips may be straightforward compared with reaching agreements on banking regulations that treat domestic and foreign firms in ways agreed to be fair.

No matter how an NTB functions, the usual result is the same as for a tariff—restricted supply, higher prices. Of course, that is the purpose: governments impose import quotas to raise price levels, increasing the revenues of domestic producers. The U.S. Government has, at various times, restricted imports of steel so that American steelmaker could raise their prices, supposedly generating profits to be put toward modernization and renewed competitiveness. Subsidies or procurement preferences for domestic suppliers have the same objective: financial support through greater cash flow or higher profits.

Keeping in mind that many NTBs in the services have possible rationales in terms of domestic regulations, they can be classified into three types:[3]

1. purely protectionist NTBs, more or less openly designed to shelter domestic companies from foreign competition;
2. quasi-NTBs, most commonly regulations with some justification in terms of domestic policies but which may also have been tailored to protect a domestic industry;
3. accidental NTBs, instituted for bona fide domestic purposes but restricting, perhaps inadvertently, trade or investment.

If pure NTBs are transparent and clearly protectionist, quasi-NTBs come with a built-in excuse—while accidental NTBs, in effect, are honest quasi-NTBs with protective side-effects. The maze of banking regulations in the United States, for example—many under the control of the States—includes some provisions that give U.S. banks advantages over foreign-owned institutions and other provisions that place U.S. banks at a disadvantage. And if a domestic industry is regulated for bona fide reasons, while foreign firms might be able to evade these regulations, then pre-conditions on entry may be quite legitimate, serving to equalize competition and avoid disruption of the industry. Insurance provides a typical case. Governments normally require insurance companies to maintain reserves of capital sufficient to cover possible claims. If the host country insists that capital reserves be held inside its borders, and if the reserve requirements are high, foreign car-

[2]The typical 7-Eleven store in Japan is half the size of one in the United States—S. Chira, "(convenience Stores Are Thriving in Japan, *New York Times,* Dec. 24, 1984, p. 33. While 7-Eleven, like many Western companies, has learned to accommodate itself to the Japanese market, others have been unable to find their way through the maze of distribution channels.

[3]I. Walter, "Non-Tariff Barriers and the Free-Trade Option," *Banca Nazionale del Lavoro Quarterly Review*, No. 88, March 1969, p. 20.

riers may decline to enter the market. Such a policy effectively insulates domestic firms. In some countries, capital requirements imposed on insurance firms fall into the quasi-NTB category, while in others they are closer to accidental NTBs.[4] A later section of the chapter discusses regulatory NTBs in banking and telecommunications in more detail.

[4]See B. Hindley, "Economic Analysis and Insurance Policy in the Third World," Thames Essays No. 32, Trade Policy Research Centre, London, 1982. In assessing the benefits of greater international competition in insurance, Hindley acknowledges the need for regulations to protect policyholders. He argues that foreign firms should be allowed into local markets, perhaps with special safeguards: as they import their own knowledge and expertise (i.e., technology), thereby exerting competitive pressures on local firms, the latter will be forced to become more efficient. In essence, Hindley advocates conditional admittance to developing economies for multinational firms, coupled with national treatment once they have been admitted, (National treatment implies the same rules for all firms doing business within the country, irrespective of ownership.) Any discrimination would then attach to the conditions of entry.

GATT AND THE U.S. SERVICES INITIATIVE

The 1982 GATT Ministerial produced only an agreement that member countries would voluntarily prepare national studies of their service industries; although the United States had hoped for a decision that services would be part of the next trade round, none was reached. Nevertheless, the process of carrying out the national studies helped move the process along, in part because most of the industrialized countries found that they had greater strengths in the services than they had realized.

The U.S. study, the first to appear (at the end of 1983), laid out this country's position:[5]

- the principle of national treatment should govern services trade;
- negotiators should seek greater transparency in regulations and trade barriers;
- GATT members should offer opportunities for comment on proposed laws or rules affecting services trade; and
- the talks should include mechanisms for settling disputes.

National treatment implies the right of foreign firms to market access sufficient for them to do business. If they are legally required to establish offices or local production facilities—e.g., to sell insurance—then national treatment is equivalent to right of establishment. More broadly, national treatment means treating foreign and domestic firms alike. The principal of *transparency* means that rules should be explicit. As a first step, parties to the multilateral trade negotiations (MTN) might make known policies and practices that regulate or limit access to their markets, creating a basis for negotiations aimed at reducing barriers and otherwise liberalizing trade and investment. Finally, the United States argued that, to function effectively, GATT codes covering services would have to be accompanied by agreement on procedures for resolving disputes. These principals have remained central to the umbrella agreement that the United States seeks. Box CC discusses the special problems of barriers to foreign investment—unavoidable given that it takes a local presence to supply many services.

By the end of 1983, both Japan and the European Community (EC) had become more receptive to discussion of services in GATT. The remaining opposition centered in a group of industrializing countries. In the fall of 1985, a year later than originally scheduled, another GATT Ministerial Meeting reconsidered the services issue in light of the national studies. At this meeting, Brazil, Yugoslavia, Argentina, and India led a coalition of developing countries opposed to including services—and especially banking, insurance, and the high-tech-

[5]"U S. National Study on Trade in Services," A Submission by the United States Government to the General Agreement on Tariffs and Trade, Prepared Under the Direction of The Office of the United States Trade Representative, Washington, DC, December 1983.

Box CC.—Where Do Agreements on Foreign Investment Fit?

No set of international agreements covers direct investment, although a start was made during the Tokyo MTN Round, completed in 1979. Since its inception in 1947, negotiations and agreements within GATT have centered on trade in tangible goods. At first, the goal was reduced tariff levels. During the Tokyo Round—the seventh held under GATT auspices—attention shifted to NTBs, primarily as they affect merchandise trade. In general, the codes negotiated in the Tokyo Round were weakly worded; none have been signed by a majority of the 92 GATT members. * Only the subsidies code touched on investment issues, in a context of state aid for capital investment.

Agreements within the Organization for Economic Cooperation and Development (OECD) do cover direct investment. The 24 OECD members include the primary exporters of services-the United States, Japan, the major Western European economies (ch. 2)–but not the less developed countries (LDCs), which tend to be net importers of services. Many of the LDCs have strongly held reasons for seeking to regulate or restrict foreign direct investment (FDI).

Depending on their objectives, governments may limit FDI to protect domestic industries, permit inward investment (while perhaps setting minimum employment levels, or requiring that some of the resulting output be exported), or offer incentives to attract foreign firms. The possibilities are not mutually exclusive; over the past two decades, LDC governments have become more sophisticated and more aggressive in bargaining with multinationals on such questions (ch. 6). Sometimes they offer investment incentives to steer resources to favored sectors—low interest loans or tax holidays, below-market leases on buildings or land, manpower training grants that reduce operating costs for the foreign firm. Government agencies may provide assistance in site preparation, build roads and ports, offer preferential access to foreign exchange, or protect the market to be served through tariffs or NTBs. Such policies are common throughout the world, not excluding developed countries and many States within the United States.

Sometimes a country may wish to encourage firms that will compete with importers; sometimes, export-oriented industries will be preferred. Many governments combine selective investment incentives with performance requirements that constrain the actions of foreign investors in a manner consistent with the country's desires. For example, a multinational corporation (MNC) might be forced to accept a joint venture with a local firm, perhaps in a minority position, as a condition for entry. Or the foreign investor might be directed to purchase from domestic suppliers—e.g., through local content rules. Numerous variations on such schemes are possible, limited mostly by the imaginations of government officials.

Because delivery of many services requires a foreign presence, negotiations on investment become a natural complement if not a necessary part of negotiations on services trade. But with governments in both LDCs and newly industrializing countries (NICs) viewing investment controls as an integral part of development strategy, negotiations will be contentious. Planning for the Uruguay Round has focused on investment controls as they affect trade flows-i. e., requirements for exporting some of the production resulting from the investment. Given this, the United States may well choose to pursue broader investment agreements in parallel forums (e.g., the OECD) and bilaterally.

*More GATT members, 35, subscribed to the standards code than to any other. The subsidies codes attracted 34 signatories, while 21 have signed the procurement code. Some counties have accepted codes but not yet formally signed. See R.M. Stern, J.H. Jackson, and B.M. Hoekman, "An Assessment of the Implementation and Operation of the Tokyo Round Codes," University of Michigan, 1988, p. 123. The subsidies and government procurement codes were drafted to cover services as well as goods.

On the effectualness of GATT, see G. Putka, "GATT Knows Who The Trade Sinners Are, But It Doesn't Matter," Wall *Street* Journal, Jan. 2, 1985, p. 1; also J. Hein, "What Will the GATT Beget?" *Across The Board,* September 1985, p. 29.

nology information-intensive services—in the new round.[6]

Developing countries were particularly concerned that they would be asked to make concessions on imports of services, even though the United States, the EC, and other advanced countries had erected new barriers against their goods, sometimes in violation of earlier agreements. Among these barriers, the opponents cited the increasingly restrictive Multi-Fiber Arrangement, voluntary restraints on shipments of steel, and more vigorous enforcement of anti-dumping and countervailing duty laws. The LDCs and NICs argued that these new barriers should be rolled back before another MTN round began. They also wanted assurances that services liberalization would not disrupt domestic banking sectors and fledgling high-technology markets, Pointing to the absence of existing GATT jurisdiction over services, the opponents tried to switch discussion to forums they regarded as more favorable to their interests—e.g., the United Nations Council on Trade and Development (UNCTAD) or the United Nations Industrial Development Organization (UNIDO).

As a group, the industrial countries responded that they needed to expand their exports of services if they were to accept a continuing flow of goods from the developing world. But not all the industrial countries were unhappy with the opposition. A number had managed to establish and maintain a strong foreign presence in services such as banking and construction despite NTBs intended to keep them out. Those that had jumped the barriers—the French in Francophone Africa, the British in their former colonies in Africa, the Japanese in Southeast Asia—now had a stake in preserving these barriers to exclude other competitors.

Still, the primary resistance came from the developing countries. These, in the end, had little option but to come to the table.[7] By late 1985, the members of GATT had agreed to start a new MTN round in September 1986. At the September meeting in Punta del Este, Uruguay, GATT members hammered out a declaration on the new round. Although the United States got much of what it wanted in the September 1986 declaration, negotiations on services will proceed on a separate track from those on goods—a concession to the countries that remain opposed to discussing services.[8] The negotiating group on services will report to the same overall committee as that on goods. When the two sets of deliberations have been completed, a special session of the parties to GATT will be held "regarding implementation of the respective results." The talks on services may also move on to sector-specific matters.

Why did it take 4 years of sometimes acrimonious debate to reach this point? Largely because the various countries defined their interests differently, with prior choice of development strategy perhaps the single most important factor.

[6] A group of lo—also including Cuba, Egypt, Nicaragua, Nigeria, Peru, and Tanzania—consistently opposed GATT negotiations on services. See W.Dullforce, "Compromise Boosts Chances for New Gatt Round," *Financial Times,* July 21, 1986, p. 2. The EC did not formally endorse services trade negotiations until March 1985. Japan was quicker to support the new round, no doubt hoping to deflect attention from its continuing bilateral trade surpluses.

[7] As continuing opposition—spearheaded by Brazil and India—led to a more confrontation} tone on the American side, U.S. Trade Representative Clayton Yeutter was quoted as saying, "We simply can't afford to have a handful of countries, responsible for 5 percent of world trade, dictate the destiny of a large number of countries who deal with 95 percent of that trade." See S. Auerbach, "Yeutter Hits Blockers of Trade Talks," *Washington Post, Nov.* 15, 1985, p. El, Ten months later, the United States was still threatening to walk out of the trade talks if other countries did not agree to its proposals—S.J. Paltrow, "Trade Aides Fail To Narrow Differences Prior to the New Round of GATT Talks," *Wall Street Journal,* Sept. 8, 1986, p. 30. As part of their counterattack, U.S. officials began to suggest that it might prove difficult to renew the Generalized System of Preferences if the LDCs and NICs continued to block the new round.

[8] For the text of the declaration, see "Ministerial Declaration on the Uruguay Round," attachment to "Testimony on the Results of the GATT Ministerial," Ambassador Clayton Yeutter, United States Trade Representative, before the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives, Sept. 25, 1986.

HOW NATIONS THINK ABOUT THE SERVICES

At some risk of caricature, the ongoing debate concerning the role and importance of services can be summarized in terms of two extreme views. The first—call it the post-industrial view—holds that services are displacing the primary (agriculture/mining) and secondary (manufacturing) sectors in all the Western economies. Not only are service firms creating most of the new jobs and wealth, but this must be counted a good thing because jobs in the primary and secondary sectors are hard, dirty, and dangerous, while service work tends to be pleasant and to pay well (at least in the professions). People of this persuasion see no cause for concern in relative or absolute expansion of the services. In fact, they see this expansion as a welcome development, part of the transition from old industrial societies to a new and better post-industrial future.[9]

Those holding the opposing view—deindustrialization—believe that the developed economies rest on a foundation of manufacturing. Expanding textile, steel, and automobile production created wealth and employment in the past, and high-technology goods will be the basis of new wealth and employment in years to come. Adam Smith, who held the services to be parasitical, was right: the growth of the services signifies weakness, an eroding industrial base. Evidence for this proposition includes the continuing high proportion of manufacturing in Japan's rapidly expanding economy. Proponents of the deindustrialization thesis point to the long-lasting distress created by layoffs and plant closings in societies that failed to protect their manufacturing base—Britain being the preeminent example. There, many firms in declining, traditional sectors have closed or contracted, unemployment remains high, foreign manufacturers continue to win larger shares of the market, while most of the new jobs lie in low-wage, tertiary services.

The post-industrial and deindustrializati on theses cannot both be true. But both could prove false, at least in their oversimplified forms. OTA's analysis, which stresses the ties between services and manufacturing—particularly in the cluster of industries that share a strong dependence on information technologies—suggests alternative paths. Computer and communications technologies help firms cut costs and pursue new competitive strategies, as discussed in chapter 8. In so doing, they accelerate processes of economic growth and structural change, They also accelerate the need for adjustment. For the United States, then, the question is not so much a matter of post-industrialization or deindustrialization; the questions become: What set of internationally competitive industries will emerge once the U.S. economy has passed what Piore and Sabel call an industrial divide?[10] What rates of growth in national income, living standards, and employment will accompany the transition from one dominant mode of doing business to another?

No one knows what the new industrial structure will look like, in the United States or elsewhere, but economic actors must make assumptions and place their bets. Certainly in Japan, the officials who staff agencies like the Ministry of International Trade and Industry (MITI) share a vision of the future in which information-based technologies will have great strategic significance, and knowledge-intensive services will account for a large share of Japan's gross national product. Most of the members of the EC have likewise begun to act on the belief that computers and communications systems will be critical in preventing further widening of the technological and competitive gaps separating them from the United States and Japan. Nonetheless, for the European countries, as for the United States, worry over job-

[9] Perhaps need less to say, Dan iel Bell pioneered this first perspective in *The Corning of Post-Industrial Society (New* York: Basic Books, 1973). The best-known statement of the second view, below, is B. Bluestone and B. Harrison, *The De-Industrialization of America* (New York: Basic Books, 1982).

[10] M. Piore and C. Sabel, *The Second Industrial Divide* (New York: Basic Books, 1984).

The new profile is hard to make out, if for no other reason than that nations ranging from Britain to the United States to Japan are somewhere in the midst of a process that may end in a period of slower paced change, but probably will not,

less growth and other pieces of the deindustrialization picture cloud visions of the future.

Development Strategies

To policy makers in the developing world, the services have rarely seemed cause for either optimism or concern. While governments everywhere pay attention to industries like banking, relative to other economic problems in the LDCs, the service sector as a whole has simply not been important. Still, a number of countries further along the development path—NICs like Brazil, Mexico, South Korea, Taiwan, and India—have begun to promote domestically based high-technology industries, with products that depend on service inputs (e.g., knowledge and information). Some of the favored business ventures have been nominally goods-producing (computer peripherals), others services-producing (data entry, software). The NICs, then, tend to see growth in the services—and especially in the high-technology services—as a necessary part of overall development strategy. Wary of concessions that might expose their emerging industries to external competition, they perceive liberalization in the services as threatening their interests.

Development strategies, despite many variations, tend to align themselves with one of two fundamental approaches: *1)* import substitution; and 2) export-led growth.[11] Import substitution begins with high trade barriers to create a sheltered domestic market; the goal is to help otherwise uncompetitive enterprises gain a foothold and begin to grow. In contrast, economies pursuing export-led development tend to have lower protective barriers—or at least less obvious barriers—relying instead on subsidies and other supports to nurture export-oriented firms. With export-led development, the faster growing businesses will typically be found in industries where the country has a comparative advantage. If it is rich in low-wage labor with adequate basic skills, many of the new businesses will be in manufacturing; arable land and a suitable climate favor agriculture.

Very generally, the Latin American NICs tend to be import substituters, while those in Southeast Asia have pursued export-led growth. Among the Asian nations, India looks more like Brazil in terms of its development strategy than Singapore or Malaysia. Needless to say, many combinations of import barriers and subsidies can be found in particular countries.

Nations following import substitution policies will normally oppose liberalization of services trade because this means lowering barriers viewed as necessary for development, This is plainly the case with Brazil. Of course, some domestic interest groups may favor reductions in trade barriers. In Brazil, firms that use telecommunications services in their own businesses would like to see fewer restrictions, as would many purchasers of computers (box N in ch. 5); nevertheless, those favoring a more open market have had little success against the combined forces of nationalist political groups and Brazilian companies dependent on protection.

Export-led developers should be more favorably disposed; liberalization, bringing better access to business services, could help the competitiveness of their manufacturing industries. Some of the service providers in these countries would no doubt prove able to compete internationally. But NICs that have been following an export-led strategy may wish to continue protecting domestic banks (which help provide financing for export-oriented manufacturers), as well as infant high-technology service industries (e.g., software in Singapore and Hong Kong). Although export-led strategies have generally proven more successful than import substitution, the Asian NICs face real difficulties in deepening their economies, Many of these countries will probably continue to go along quietly with those seeking to delay meaningful liberalization of trade and investment in the services,

[11] The discussion following owes much to S. Haggard and C.-I. Moon, "The Korean State in the International Economy: Liberal, Dependent or Mercantile," *The Antinomies of Interdependence,* J. Ruggie (cd.] (New York: Columbia University Press, 1983]. Also see *National Policies for Developing High Technology Industries,* F.W. Rushing and C.G. Brown (eds.) (Boulder, CO: Westview, 1986]; and *International Competitiveness in Electronics,* op. cit., pp. 383-389.

High Technology and the Promotion of Innovation

The contrasting views of the future of industrial society outlined above explain some of the squabbling leading up to Punta del Este. Beyond the more abstract debates over development strategy, post-industrialism, and deindustrialization, many governments are beginning to pay more attention, in a practical sense, to the linkages between services and the rest of their economies. For instance, telecommunications issues such as pricing and TBDFs have excited interest in both industrial countries and the NICs (box DD). To policy makers, the infrastructural role of telecommunications has come to seem a pre-condition for development paralleling in significance the networks of railroads and highways of earlier years. Many governments have provided support for information-related technologies believing that this would contribute to development and competitiveness throughout their economies.

Policy makers seeking to promote innovation can choose from a long list of tools. But effective choices depend on a policymaking system that enables government to formulate and implement policies with some consistency. In most of the countries that have developed such systems—typically through often-painful learning and experience (e.g., in Japan)—the industrial policy apparatus is relatively centralized. With only a few agencies involved, and with political traditions that grant powerful tools to government—subsidized loans, control over access to import licenses, funding for development of proprietary technologies—industrial and technology policies can be coherent and targeted. (Of course, consistency is not always a virtue; many governments have stuck too long with bad ideas.) Table 46 summarizes some of the similarities and differences in approach to technology policy in five major industrial countries.

Japan

If centralized institutional arrangements for industrial policies carry substantial risks—i.e., failure to recognize mistakes and abandon un-

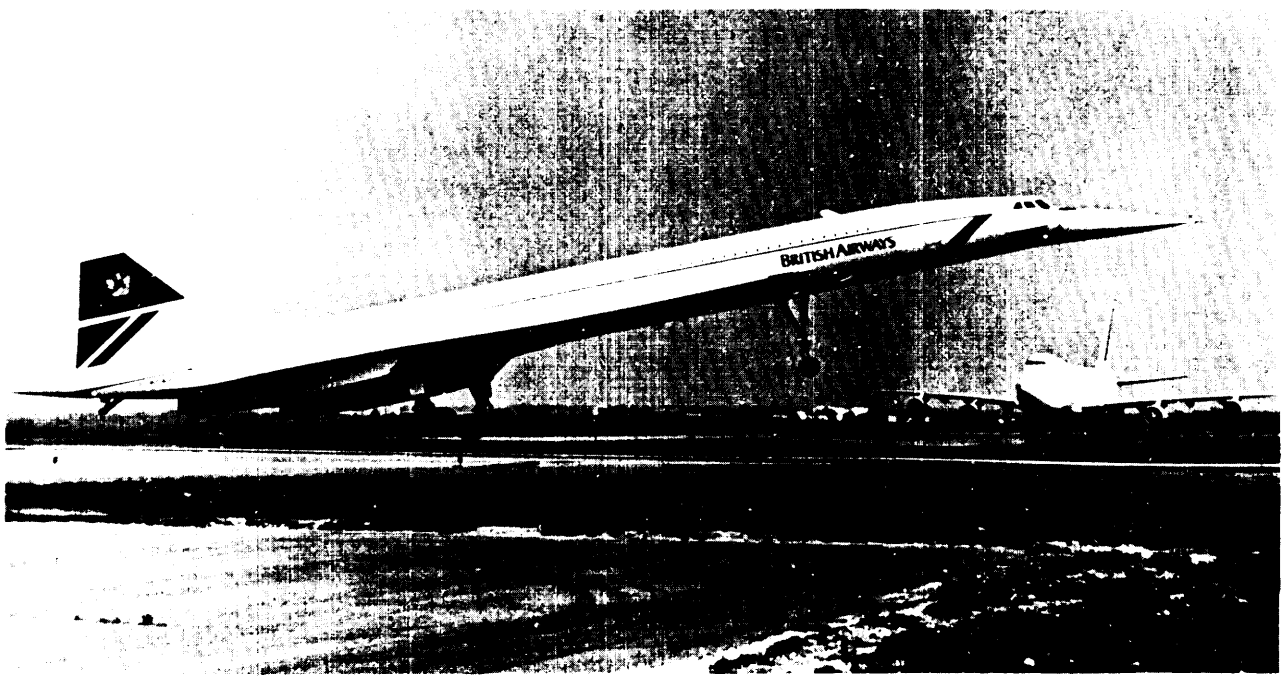

Photo credit: British Airways

Governments have often played major roles in aircraft manufacturing (e.g., for the Concorde, pictured here) as well as in air transportation.

Box DD.—Transborder Data F1ows and Related International Telecommunications Issues*

Frequently cited examples of government restrictions on transborder data flows include Brazil's limits on access to foreign databases and West Germany's local processing requirements (ch. 5). The latter force companies that supply remote data processing and information services to carry out a portion of the associated computing within the Federal Republic. Some observers also cite U.S. restrictions on data communications between Dresser Industries and its French subsidiary during the Siberian pipeline dispute of **1982.**

Since the middle 1970s, the Organization for Economic Cooperation and Development has been the primary forum for discussing TBDF restrictions. Governments have tended to rationalize their TBDF policies and proposals in terms of concern for personal privacy, in contexts ranging from credit ratings to medical records. Much of the early work by the OECD staff explored the issue in this context. But it soon became clear that TBDFs should be viewed more broadly, as a new form of protectionism and a possible revenue source for governments.

Customs duties on data or information-one form of TBDF restriction—raise the question of determining value. While potentially controversial, valuation of data flows may in the end be more important for measuring trade volumes than in relation to possible trade barriers. The problems of establishing the value of information are compounded **when the information moves between divisions of a multinational enterprise. Just as for royalties on licensing agreements, an MNC may charge subsidiaries either more or less than the prices that would be set in a market transaction. To the multinational, such charges can become a useful means for transferring funds internationally.**

Beyond the question of customs valuation lies a narrower issue, one of far greater near-term significance: tariffs (pricing) for international telecommunications. In the past, tariff structures have commonly been based on connect-time—the elapsed time for transmitting a message, regardless of the volume of data transmitted. More recently, some countries have proposed or implemented tariffs based on the volume of information (as measured, for example, by the number of bits of digital data). This is partly a consequence of the transition to packet switching. A packet-switched telecommunications system breaks down messages-voice as well as digital data—into short bursts, or packets. **The packets can be sent independently of one another (i.e., over different circuit paths); they are reassembled at the receiving end. With independent routing of the packets, circuit paths can be utilized to their full capacity (avoiding, for example, dead time because of pauses in any one message). Because each packet must be tracked during transmission, it is an easy matter to base charges on the number of packets sent, rather than the time required to transmit the message.**

Volume-based pricing has been an attractive prospect for some PTTs (post, telegraph, and telephone authorities), particularly those that view faster speeds for data transmission as taking money from their pockets. Many PTTs see the added revenues from volume-based tariffs as a help in subsidizing postal services, in paying for investments in infrastructural improvements like ISDN (Integrated Services Digital Networks, ch. 5], or for diversifying into value-added services. Any large-scale movement toward volume-based tariffs, however, would mean substantial disruptions in an international system which has grown and prospered under time-based pricing, closely related to actual costs. Time-based pricing has created strong incentives for innovations that increase transmission speed. A shift to volume-related pricing would move the system away from cost-based prices. It would also radically alter the incentives for innovation, slowing the pace of technological advance in telecommunications-related services and equipment, while making a good deal of existing technology, particularly customer premises equipment, obsolete. Beyond this, movement toward volume-based pricing could greatly increase costs for some users of the international telecommunications

*The best single summary of **TBDF** issues remains L de **Sola** Pool and **R.J.** Solomon, **"Transborder** Data Flows: Requirements for International Co-Operation," ***Policy Implications of Data Network Developments in the OECD Area*** (Paris: Organization for Economic Cooperation and Development, 1980), pp. 79-139. Also see J. **Bortnick,** "International Data Flow Issues," Congressional Research Service Issue Brief IB8104O, Apr. 19, 1985. For a summary of the activities of a dozen international bodies, see **K.P. Sauvant,** ***Trade and Foreign Direct Investment in Data Services*** (Boulder, CO: Westview, 1986), **app.** C.

infrastructure. MNCs and other major customers have understandably been concerned that PTTs might use their monopoly positions to raise tariffs arbitrarily, upsetting corporate investment plans. Given that regulators in the United States have avoided volume-related pricing, and that American firms have come to depend on pricing is a function of connect-time only, the U.S. Government may find itself needing to defend the interests of American companies in both bilateral and multilateral negotiating forums in the years ahead.

Table 46.—Technology Policy in Five Industrial Countries

	Reliance on industry-specific measures	Centralization within government	Reliance on defense spending
United States	low	low	high
Japan	high	high	low
Federal Republic of Germany	low-medium	medium	low
France	high	high	high
United Kingdom	med i urn	low-medium	medium

SOURCE Office of Technology Assessment, 1987

promising avenues—Japan, preeminently, has evolved a policymaking system that seems both centralized and effective.[12] In recent years, MITI has had to share some of its power with other agencies—e.g., the Ministry of Posts and Telecommunications–but policymaking authority remains concentrated in comparison with most other advanced industrial economies. The Japanese Government no longer uses direct subsidies or control over import licenses to persuade firms to move in particular directions. Nevertheless, through measures such as incentives for joint development of new technical know-how, the government has helped Japanese firms reach the technological frontiers (perhaps the best-known example being the VLSI project of the late 1970s). At the same time, Japan's Government has taken advantage of fierce rivalries among the nation's industrial groups, or *keiretsu,* to assure that domestic competition remains a spur to competitiveness even as firms share some of the work of technology development.

United States

The United States also promotes technology development, but–preferring the hurly-burly of political competition to the competition of ideas—does so using different methods. As discussed in chapter 6, military funding provides most of the government push for technology development. Health-related spending is a distant second. In comparison with Japan and the EC, Federal agencies support little commercially oriented R&D.

Widespread support for university research, coupled with R&D funded by the Department of Defense (DoD) in the larger aerospace and electronics firms, and in Federal laboratories, have created an unmatched scientific establishment and an equally unmatched array of high-technology military systems. With some exceptions, neither the science base nor the military technologies have been very closely linked to the needs of commercial firms; today, the increasing specialization of mission-oriented military R&D throws even the theoretical possibilities for strengthening such linkages into doubt.

Defense spending has biased U.S. strengths in the direction of technologies with at least a dual-use nature: commercially, the United States generally does best where technical knowledge can be adapted to civilian as well as military applications. Noting again the exception of medical research (which has laid many of the foundations for biotechnology),

[12] For a review of both process and substance in Japan's approach to high technology, see *International Competitiveness in Electronics,* op. cit., pp. 413-422.

U.S. excellence in aircraft, computers, space technology, and telecommunications has depended in part on complementarities between military and civilian technologies. These complementarities will diminish as defense systems become more exotic and competition in civilian technologies from countries like Japan grows more intense. The trends are plain in both the aircraft and electronics industries, where military and civilian technologies have been diverging for 25 years and more. In the future, spillovers from military R&D will have still weaker effects in stimulating internationally competitive civilian industries.

Europe

Despite earlier scares over technology gaps, only since the beginning of the 1980s have the EC nations grasped how far they were falling behind the United States and Japan. While many European governments have traditionally supported technology development, the EC Commission has also begun to channel substantial funding in this direction. Planning began in 1982 for the ESPRIT program (European Strategic Program for Research in Information Technology, box EE), which supports work in computers and information technology. ESPRIT has been followed by RACE (R&Din Advanced Communication-technology for Europe), BRITE (Basic Research on Industrial Technologies for Europe), and Eureka—this last intended to be closer to commercial technology development than ESPRIT.

Current plans call for all the Eureka money to come from national governments and the companies involved, rather than the EC budget. The Europeans have held that U.S. military spending amounts to a subsidy for American high-technology industries. With the French, in particular, claiming that the Strategic Defense Initiative (SDI) would become a technological cornucopia for American firms, Eureka emerged in part as a counter to SDI spending. Recent signs suggest that the Europeans are beginning to appraise the benefits of military R&D more realistically .13

Most of the Community's members have well-established industrial policies of their own, with responses to the technological challenges, especially of Japan, that span a considerable range. (While Europe has in many respects learned to live with U.S. investments and exports, Japan's successes, many of which have come at the expense of European more than American manufacturers, have provoked new anxiety.) West Germany, for instance, pursues its technology policies mainly through the Ministry of Research and Technology (the German acronym is BMFT), which relies heavily on direct R&D subsidies. Over the years, BMFT programs designed to promote information technologies—focusing primarily on mainframe computers and microelectronics—have met with limited success at best.[14] While the BMFT has recently given more attention to telecommunications and software development, a hardware bias still seems to characterize the programs of both the government and of major (and favored) firms like Siemens.

French policies have been more imaginative, as illustrated by the Teletel/Minitel system described in chapter 5. In its policymaking system, France resembles Japan more than Germany or the United States. But while Japan spends little on defense-related R&D, France relies heavily on military spending to stimulate technology development; although the French Ministry of Research and Industry is the center for industrial and technological policymaking, defense planners have a strong voice (and not just because of the funds they command).

While direct subsidies like the Alvey program (box EE) have been common in the United Kingdom, the British Government exerts less control over the fate of firms and industries than is the case in France. As in France and the United States, relationships between the government and defense contractors have been central to Britain's technology policy. In both the United Kingdom and France, large firms—many with commercial interests in computers and telecommunications—get substantial pro-

13P. Lewis, "Military Spending Questioned," New *York Times*, Nov. 11, 1986, p. D1.

[14] *International Competitiveness in Electronics*, op. cit., pp. 405-412.

Box EE.—ESPRIT and Alvey: Two European Technology Development Programs

ESPRIT's 200 current projects are pointed at pre-competitive R&D—well before the stage of commercial development. By drawing a line upstream from commercialization, the program seeks to avoid overlap or conflict with ongoing R&D funded by national governments or by participating companies. The ESPRIT schedule calls for $1.3 billion in funding over the period 1984-89. A dozen large companies carry out much of the research in five principal areas: microelectronics, software, advanced information processing, office automation, and computer-integrated manufacturing. At the same time, program requirements call for each project to involve participants from at least two EC countries, so that several hundred smaller firms also take part. So do more than a hundred universities and nearly as many research institutes. The program aims not only at developing technology, but, by encouraging cooperation, at changing the relationships among firms in Europe as one step toward a more truly common market. Whether it will succeed in this latter objective remains to be seen.

Britain's Alvey program—named for the chairman of the committee that recommended it—represents an explicit response to Japan's fifth-generation computer effort (ch. 5). Beginning in 1984 and planned for 5 years and a total budget of $525 million, Alvey supports individual projects chosen on a competitive basis. The Department of Trade and Industry, which is responsible for program management and overall coordination, contributes the major share of government financing, along with the Department of Education and Science and the Ministry of Defense. Alvey funds go toward five principal types of research:

- computer architectures;
- very large-scale integrated circuits (VLSI);
- expert or knowledge-based systems, a form of artificial intelligence (AI);
- man/machine interfaces (which includes other AI work); and
- software engineering.

Alvey's software engineering R&D is aimed quite directly at increasing the international competitiveness of British industry; a stated objective is "to establish tools and methods necessary for the production of high quality, cost effective software of world leading standard."* To aid in this, a portion of the budget has been set aside for diffusing technology to industry.

With 300 projects involving more than a hundred companies and almost all of Britain's universities, often in partnership with industry, the program's directorate has struggled with problems of coordination—as well as with evaluation of project proposals—in an effort to make Alvey add up to something more than the sum of its parts. Good proposals have been scarce in some technical fields, leading the directorate to take an active role in encouraging formation of project teams. Elsewhere, notably for work related to VLSI microcircuitry, large numbers of proposals have been received and funded; nearly half the money committed through mid-1985 went toward VLSI R&D.**

Evaluating such a program shortly after its halfway point can be unfair as well as misleading, but Alvey does seem to be overemphasizing hardware, and particularly integrated circuits, at the expense of soft-ware and applications. In part, this reflects the predilections of British research scientists and engineers, far more of whom have worked on hardware problems than software in the past. Even more, as a research program—and again despite the efforts of its managers and the objectives set down so frequently in program documents—Alvey seems in danger of following the path of its many predecessors: giving research a boost without finding ways to translate the results into meaningful help for industry.

*D.E. Talbot, "Alvey Software Engineering-A Strategy Overview," Alvey Directorate, London, Department of Trade and Industry, no date, p. 1.

**"Chips Take Lion's Share of Alvey Cash," *Financial Times*, June 18,1985, p. 6. Also, D. Fishlock, "'Tripe' To Describe Alvey Programme As Just Academic," Financial Times, Nov. 4, 1986, p. 10.

The EC's ESPRIT program has also budgeted more money for microelectronics than any of its other four areas, but ESPRIT looks considerably better balanced than Alvey. The ESPRIT allocations: microelectronics, 23.5 percent; advanced information processing, 22.8 percent; office automation, 21.9 percent; software, 18.9 percent; and computer-integrated manufacturing, 12.9 percent—H. Hunke, "Updating the European Strategic Program in Information Technology [ESPRIT)," presented at the Artificial Intelligence Conference, London, Apr. 14-15, 1986.

portions of their revenues from military contracts and have become primary agents of technology promotion.

R&D Supports and Subsidies

As pointed out in box B (ch. 1), service industries depend on much the same technology/science base as manufacturing. Interdependencies are many: for example, the design of telecommunications equipment will be a function of the services to be provided. But with the exception of the information-related industries, services remain close to invisible in the industry/technology policies of most countries (as opposed to their regulatory policies), Indeed, governments seldom collect meaningful statistics on R&D in the services (see box FF); many—including the U.S. Government—barely seem to recognize that service companies conduct product and process development projects much like those found in manufacturing firms.

When it comes to telecommunications and related industries, governments have paid far more attention to the development of new equipment than new services; often when they have promoted services, governments have done so to support related manufacturing sectors. Thus in the 1950s, Japan rapidly expanded its television broadcasting to help build domestic sales from which the country's consumer electronics industry could gain strength before moving into export markets.[15] Nor are programs like ESPRIT and Alvey (box EE) new; indeed, they can be viewed as responses to government projects elsewhere.

In the 1960s and 1970s, governments in Europe and Japan sought to help their computer industries catch up with American firms. In the latter part of the 1970s, microelectronics technologies rose to the top of priority lists. In large measure, the microelectronics thrust in ESPRIT represents a European response to Japan's earlier VLSI project. The same is true of France's Plan des Composants, and the Philips/Siemens Megabit project, while Japan's fifth-generation computer project (ch. 5) has been met by the software and AI portions of ESPRIT and Alvey. In the industrial policy equivalent of an arms race, escalating expenditures for high technology have culminated in very large efforts like Eureka and France's multi-billion dollar Filiere Electronique. Those in Europe who see military spending as central to U.S. technology policy might wish to add SDI to the list. But it is Japanese rather than American efforts that have stimulated most of these reactions.

Nonetheless, in Japan—with the uncertain exception of the ISDN Information Network System project—MITI and other government agencies have generally funded technology development at relatively low levels. Programs like ESPRIT and Alvey support many individual projects, chosen competitively. Japanese industrial policy provides money for a wider variety of projects, with extensive efforts to maintain coordination (although many in the West have overstated the degree of cooperation among Japanese firms).

Table 49 illustrates in terms of MITI's projects (only) for information-related technologies (only) during 1985 and 1986. Tax incentives, some of which are substantial, have not been included. Omitting the loan funds that are listed, the 1986 total does not reach $400 million. MITI's support, then, is noteworthy more for the diversity of projects than for the money provided. The Japanese approach has evolved over many years of experience in supporting technology development. No list even remotely similar in range could be compiled for any U.S. Government agency; indeed, even if *all* U.S. Government agencies were surveyed, the results in terms of comprehensiveness and attentiveness to industrial development needs would pale alongside table 49. Recent history also suggests that Japan's approach works better than the European efforts described earlier.

The military thrust of U.S. R&D programs compared to those of other countries, and especially Japan, raises real questions for the Nation's technology policy. The Japanese need not devote resources to the design and production of integrated circuits that can withstand the

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15 Ibid., pp. 119-121 and 180-182. Many countries have also used broadcasting standards as NTBs to shelter their domestic industries from foreign TV manufacturers.

Box FF.—How Much Does the United States Spend on Services R&D?

To the casual observer, R&D in U.S. service industries must seem nearly invisible. The National Science Foundation's (NSF) biennial Science *Indicators* series–the primary U.S. Government compilation of R&D statistics—hardly mentions the services. A few summary tables suggest that non-manufacturing industries account for 3 to 4 percent of U.S. spending on industrial R&D—a little over $2 billion currently. * Table 47 summarizes the NSF figures, which are much too low to be realistic.

Many activities of service firms fall outside NSF's definitions of R&D, which have been oriented toward manufacturing companies. At the same time, many service firms—even those that for years have budgeted substantial sums for the development of proprietary technology–do not think of what they do as R&D, at least in self-conscious or systematic fashion. For example, product development departments in banks are new, as pointed out earlier in this report, even though they may simply represent a reorganization of existing functions. The extraordinarily low figures in table 47, then, reflect underreporting of R&D expenditures for largely historical reasons—much like the underreporting of exports and imports of services in the U.S. current account (i.e., collection and reporting of data under obsolete or unexamined rules). NSF does plan somewhat broader coverage of services in its next survey, to be conducted in **1988,**

What would a more realistic estimate look like? The very large size of the service sector of the U.S. economy suggests that, even if few service firms spend more than a fraction of a percent of sales on R&D, the total must be substantial. And in fact, some service companies allocate several percent of sales to such activities (although others spend little or nothing).** Data on R&D spending as a percentage of sales provides the basis for sectoral estimates carried out at Battelle Memorial Institute and included in Battelle's recent R&D forecasts.*** Using an input-output model, Battelle's procedure yields estimates of R&D by line of business—regardless of the nominal sectoral classification of the firm conducting the R&D. The result is a series of estimates for services-related R&D, some of it conducted by firms otherwise classed in manufacturing industries. (Some of these firms produce services as well as goods; others sell to service firms and carry out services-related R&D to support this portion of their business.) Table 48 gives Battelle's estimates for the 10 largest industry sectors in terms of sales, as well as summary figures for all of U.S. industry. While the figures for individual sectors should be seen as only rough approximations, the table as a whole gives the best picture of services-related R&D spending that OTA knows of.

As table **48** indicates, the services, as a whole, spend only 0.7 percent of sales on R&D—compared with more than 2 percent for the goods-producing portion of the economy. But the services total reaches **$26** billion, more than 10 times greater than the NSF figures for non-manufacturing industries in table 47. (Battelle's services total comes to about one-quarter of industrial R&D, and one-fifth of the **$127** billion forecast for all U.S. R&D in 1987, including that performed by government, universities, and nonprofit laboratories.) This $26 billion figure seems a reasonable estimate for total services-related R&D spending in the United States—a sum suggesting that R&D in the services is far more important than has been commonly appreciated. (To OTA's knowledge, no estimates comparable to those in table **48** exist for other countries.)

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*According to the most recent edition of ***Science Indicators,*** more than half of this R&D takes place in the following R&D-performing non-manufacturing industries: electric, gas, and sanitary services; computer and data processing services; miscellaneous business services (including R&D laboratories and computer software firms); and engineering, architecture, and surveying. Sea Science ***Indicators: The 1985 Report*** (Washington, DC: National Science Board, 1985), p. 78. Health services go unmentioned, although the 1986 Federal budget figure for health-related R&D of $5.1 billion can be found on p. 227. Much of the health services industry consists of not-for-profit institutions, presumably excluded from summary figures for "R&D-performing non-manufacturing industries." But the primary point is that spending on health-related R&D is nowhere associated with a major identifiable service sector. The same is true for education.

NSF's definition of development, referred to below, reads as follows: "systematic use of the knowledge or understanding gained from research, directed toward the production of useful materials, devices, systems or methods, including design and development of prototypes and processes" (p. 221). Given this wording, a good deal of R&D directed at new service products and processes ***should*** qualify.

See K.J. Freeze and R.S. Rosenbloom, "Bane One Corporation and the Home Information Revolution," Harvard Business ***School* Case Study 9-882-091, 1982, for discussion of R&Din a bank that allocates 3 to 5 percent of earnings to R&D–several million dollars annually. Should the 3 percent be representative for the banking industry as a whole, annual R&D spending by U.S. banks alone would approach $500 million. Manufacturing firms typically spend in the range of 1 to 10 percent of sales on R&D, with industries like primary metals (e.g., steel) near the bottom, and high-technology sectors like computers near to the top.

Probable ***Levels of R&D Expenditures in 1987.' Forecast and Analysis (Columbus, OH: Battelle Columbus Division, December 1986), pp. 19-22.

Table 47.—U.S. Government Figures on Industrial R&D Spending[a]

	Expenditures (billions of current dollars and percentage of total)			
	1970	1980	1983	1986[b]
Manufacturing industries (all)	$17.4 (96.1%)	$42.7 (95.9°/0)	$60.8 (96.7°/0)	$83.0 (97.4°/0)
Non-manufacturing industries	0.705 (3.9%)	1.82 (4.1 °/0)	2.07 (3.3°/0)	2.26 (2.60/o)

[a]R&D performed by private companies, including that paid for by the Federal Government. NSF reports Federal funding for R&D carried out by non-manufacturing industries at $0779 billion in 1980, and $1.048 billion in 1983 The estimated 1986 figure is $1.092 billion.
[b]Estimated.

SOURCES. 1970, 1980, 1983—*Science Indicators: The 1985 Report* (Washington, DC: National Science Board, 1985), pp. 253.254, 265. 1986—*Probable Levels of R&D Expenditures in 1986: Forecast and Analysis* (Columbus, OH: Battelle Columbus Division, December 1985), p. 12.

Table 48.—Estimated 1987 R&D Spending by U.S. Service and Goods-Producing Sectors[a]

	R&D as a percentage of sales	Estimated 1987 R&D spending (billions of dollars)
Service sectors:		
Trade	0.44°/0	$3.39
Real estate	0.04	0.22
Residential construction	0.60	1.59
Finance and insurance	0.50	1.21
Nonresidential construction	0.60	1.41
Educational services	0.60	1.38
Other business/professional services	2.50	4.15
Top seven services	0.54°/0	$13.3
All services	0.73°/0	$26.0
Goods-producing sectors:		
Food production	1.0 °/0	$3.88
Motor vehicles	2.41	6.01
Petroleum refining	0.60	1.45
Top three goods-producing	1.29°/0	$11.3
All goods-producing	2.15°/0	$69.9
All U.S. industry[b]	1.36°/0	$98.5

[a]Only the ICI largest sectors, as ranked by sales, have been listed separately—7 service sectors, and 3 goods sectors. R&D expenditures include government-funded projects conducted by industry, Sector definitions do not necessarily correspond to those of the Standard Industrial Classification system. The all-services subtotal excludes public utilities The all-goods-producing subtotal includes agriculture and mining
[b]All services plus all goods-producing plus public utilities

NOTE. Subtotals may not add because of rounding

SOURCE: *Probable Levels of R&D Expenditures in 1987: Forecast and Analysis* (Columbus, OH: Battelle Columbus Division, December 1986), pp 21-22

electromagnetic pulse from a nuclear explosion, or to software for controlling a ballistic missile defense system. Will technologies from DoD's VHSIC (Very High-Speed Integrated Circuit) program, SDI, and the DoD Strategic Computing effort yield fruitful commercial spinoffs, such as benefited American computer and electronics firms in earlier years? The increasingly specialized nature of military technologies suggests skepticism. Rather than assuming that military spending will in some sense pa y off in the civilian economy, U.S. policy makers might pay closer attention to programs like Japan's SIGMA or France's Teletel/Minitel—perhaps even to the extent of seeking to emulate some of their objectives.

Table 49.— Projects Related to Information Technology Supported by Japan's Ministry of International Trade and Industry

Description	Budget (millions of yen)[a] 1985	1986[b]
Robots for dangerous conditions (JUPITER)	1,900	2,450
Fifth-generation computing	4,780	4,500
High-speed computer	3,020	2,930
New-function integrated circuits	1,590	1,540
Reliability improvement for information equipment	—[c]	11,000[d]
Industrialization of software production (SIGMA)	—[c]	6,000[d]
Interoperative database technology	20	840
Survey on information processing in education	—[c]	220
Teacher education and training related to information technologies	—c	1,000[d]
Promotion of database and information services	10	110
Development of databases and information processing and communications systems	—c	7,500[d]
Support for smaller businesses:		
Information networks	30	370
Software	—[c]	200
Consulting	—[c]	440
Loans	—c	4,300[e]
Equipment leasing	—[c]	41,000
Planning and development of information systems for model communities	70	70
Survey on regional information systems	—[c]	10
Promotion and improvement of regional information systems	—c	4,000[e]
Development of standards	70	880

[a]Because of recent exchange rate shifts, fiscal year budget levels have been given in yen For 1985. the average rate was 237 yen to the dollar The rate dropped to an average of 167 yen to the dollar in 1966
[b]Request
[c]1986 first year
[d]Allocation for Japan Development Bank loans
[e]Including loan funds

SOURCE "MITI's Fiscal 1986 Policy Measures Outline," *Japan* RePod–Science *and* Technology. Joint Publications Research Service JPRS-JST-86-060-L, Aug 29, 1986, PP 84-99 Translated from *Nikkei Electronics*, October 1985

OTHER POLICIES RELEVANT TO THE SERVICES

The remainder of this chapter adds more detail to the picture of development strategies begun earlier, covering several other policy tools listed in table 45. Chapter 10 turns specifically to U.S. policies and options.

Public Procurement

Government funds pay for heavy construction projects (ports, the Interstate Highway System). Telecommunications and data processing firms find some of their best customers in government agencies, as do computer software suppliers. In France, the government has begun to subsidize outside consulting services for small and medium-sized firms; the aim is to build demand for business services, while at the same time helping smaller French manufacturing companies adjust to changes in their markets.

As noted in chapter 5, preferential purchasing policies by Nippon Telegraph & Telephone (NTT)–until recently a public corporation–helped the company's suppliers improve their technology. Favored firms built large and capable organizations on the base of sheltered domestic markets created for them by NTT and the Japanese Government. Although manufactured products were the focus, the impacts spilled over into services, just as U.S. Government purchases of semiconductors and computers provided indirect aid for the software and telecommunications services industries here.

Attempts by European governments to build national champion firms have been less successful than in Japan. The European examples show the possible costs of sheltering domestic industries through procurement preferences. Favored firms may be less inclined to compete for international markets, and, as time passes, less able to do so—a problem that Japan has avoided in part through continued strong domestic competition, which has pushed Japanese firms to innovate rapidly and effectively.

Despite the partial exceptions of the information industries and construction, public procurement has seldom been turned to the direct promotion of service industries the way it has for, say, computer hardware. Thus an extension of the existing GATT Agreement on Government Procurement to cover services seems a reasonable prospect. This code, relatively weakly worded, currently exempts all services except those directly linked with purchases of goods. It also exempts preferential procurement policies that can be tied in some way to national security—a big loophole. Extending the Agreement to services irrespective of association with goods, and strengthening it generally, should help open service markets for many American firms. Of course, this would also open previously sheltered U.S. markets; thus the engineering and construction industry opposes such a step.

Regulatory Policies

Regulations as NTBs

When regulations function as quasi-NTBs, the difficulty for negotiators, legislators, and those charged with enforcing the rules is to separate legitimate uses from illegitimate. Some cases are obvious—rules that bar foreign-owned bank offices or subsidiaries (the practice until recently in Canada, Japan, and Australia). More subtly, governments may require foreign banks to maintain higher capital/loan ratios, or restrict access to clearinghouses or giro payments networks. The Tokyo Stock Exchange remained closed to foreign firms until 1985, when—after continuing pressure from the U.S. Government —four American companies were given seats. In professional services, licensing restrictions have often become quasi-NTBs, Table 50 gives further examples. Many of the NTBs listed have been in place for years–e.g., in ocean shipping. They can have major consequences for competitiveness, the more so if some countries maintain much tighter restrictions than others,

When regulatory regimes in industries like shipping remain stable over time, firms in various parts of the world eventually adjust to the competitive landscape. But shifts in regulations can have sudden and sharp consequences for international competition. In recent years, two events in the United States have upset the status quo: passage in 1978 of the International Banking Act, and the AT&T breakup 6 years later. The International Banking Act gives foreign banks relatively unrestricted access to the U.S. market (while placing their operations here under the U.S. regulatory system), The AT&T breakup likewise opened American markets to foreign suppliers of telecommunications equipment,

With domestic markets open, the U.S. Government has strong incentives to seek equal access abroad on behalf of American companies. Of course, the unilateral nature of U.S. actions has meant that foreign governments have little reason to go along unless the United States threatens to reverse course and close its markets once more—a threat embodied in some of the reciprocity legislation introduced in Congress over the past few years. Other countries have objected strenuously to the protectionist flavor of such measures, despite the fact that a number of regulatory bodies in the United States—including the Federal Communications Commission (FCC) —already apply reciprocity principles in decisions affecting international business.

Examples From Banking and Telecommunications

Regulatory regimes in financial services vary greatly among the industrial countries. Both France and Germany permit universal banking —i. e., they make no distinction between investment banking and commercial or retail banking. In the United States, Britain, and Japan,

Table 50.— Examples of Regulatory Barriers Affecting Services Trade and Investment

Banking:	
Canada	Foreign banks limited to no more than 16 percent of total banking system assets (8 percent until 1984)
Mexico	Market closed to foreign banks except through offshore banking facilities
India	Higher taxes on foreign banks
France	Domestic banks have access to subsidized loan funds
Insurance:	
Bolivia	Foreign insurance companies required to maintain much higher capital reserves
Australia	No new foreign entrants permitted (many other countries have similar restrictions)
Turkey	Some reinsurance must be placed with publicly owned company
Telecommunications:	
United States	No foreign ownership of basic telecommunications service providers
Japan	Foreign participation limited to joint ventures
Federal Republic of Germany	Public monopoly for all services
France	Public monopoly for all except information services
Engineering and construction:	
United Kingdom	Only British firms eligible for design contracts on North Sea oil projects
Venezuela	Foreign consultants must work through local firms
United States	Embassy construction abroad may be limited to U.S. firms
Shipping:	
United States	Jones Act restricts coastal shipping to U.S. carriers (many other countries have similar restrictions)
Airlines:	
Portugal	Government loan guarantees and other financial assistance (many other countries subsidize domestic air carriers)
United States	Government travel restricted to domestic carriers

SOURCES Off Ice of Technology Assessment, "Selected Problems Encountered by U S Service industries in Trade in Services," Off Ice of the United States Trade Representative, printout, Sept 6, 1985.

more or less strict rules prohibit commercial banks from engaging in some forms of investment banking and brokerage activities. U.S. banks cannot participate directly in the financing of corporate stock or bond offerings; Japanese banks can hold ownership shares in corporations as part of their overall portfolios, but cannot act as brokers or trade in stocks.

As markets for financial services have become more internationalized, American banks and investment firms have pressed for relaxation of regulatory restrictions, particularly those that have not applied to their competitors overseas. Other countries, noting the deregulatory momentum in the United States, react with similar steps of their own—steps that in some cases will have major consequences for international competition. Certainly this is the case with liberalization of financial markets in Japan and elsewhere, as discussed in chapter 3. (See table 51 for recent changes in financial services regulations.)

Japanese corporations increasingly seek funds in international capital markets, Foreign companies have begun to seek capital in Japan or the Euroyen market. Greater competition inside Japan will result in aggressive moves by Japanese financial institutions abroad, with the yen becoming a more common international medium of exchange. Trading volume on the Tokyo Stock Exchange will continue to increase; indeed the Japanese stock market passed that of the United States in total capitalization in the spring of *1987*. Meanwhile in London, the deregulatory "Big Bang" of October *1986* means new opportunities for British financial services firms at home, reducing their need to move overseas, but also creating new opportu-

Table 51 .—National Treatment in Financial Services

Banking:	
United States	National treatment; some State laws may restrict entry
Japan	Substantial progress toward national treatment since 1979
Canada. ., ... ,	Incremental shifts toward national treatment in 1980 and 1984; further changes proposed for 1987
Securities firms:	
United States	Federal law generally calls for national treatment and equality of competitive opportunity
Japan	National treatment generally followed; some movement toward full equality of competitive opportunity
Canada	Varies by province (Ontario prohibits entry into full service securities businesses, while Quebec, for instance, allows foreign firms to enter and operate on same terms as Canadian firms)
France	Entry and national treatment accorded with some exceptions (e. g., membership on the Paris Stock Exchange limited to firms with headquarters in the European Community)
United Kingdom	Major reforms in progress, with relatively open entry and national treatment expected under most circumstances

SOURCES "National Treatment Study. Report to Congress on Foreign Government Treatment of U.S Commercial Banking and Securities Organizations, 1966 Update," Department of the Treasury, Washington, DC, December 1966, "Report to Congress on Forelan Government Treatment of U.S Commercial Banking Organizations 1984 Update," Department of the Treasury, Washington, DC, 1984

nities for foreign firms to enter the U.K. market; when the deregulatory schedule was announced, American financial services firms quickly began seeking mergers and acquisitions in Britain.

Despite greater integration in world financial markets, asymmetries in regulatory regimes will persist. Should the United States move toward universal banking, for instance, this would come about only after prolonged debate, or, more likely, continued piecemeal erosion of existing restrictions. Policy makers will have to weigh not only domestic concerns, but the impacts of regulatory change on the international competitive position of U.S.-based banks —a question seldom considered in the past, but now of considerable import. But the policy-making apparatus in the United States does not yet reflect the new importance of international competition in financial services.

Table 52 contrasts regulatory regimes for telecommunications in the five large industrial countries. In the United States, competition in long-distance services has been largely deregulated, although AT&T's rates remain under some controls as a result of the settlement agreement. With a shaky distinction between basic and enhanced services, and the seven regional holding companies (RHCs) formed after the breakup still precluded from offering the latter, the stage seems set for continued controversy. Policy guidance, after a fashion, continues to come through the offices of the FCC, the Department of Justice, and U.S. District Court Judge Harold Greene.

The German system provides the greatest contrast with deregulation here (see box N, ch. 5). In the Federal Republic, a single agency, the Bundespost, remains the monopoly provider of communications services, including mail and television. The other three countries offer closer parallels with the United States—as well as possible lessons. Japan's system, for example, shows the advantages of a clear separation between basic and enhanced services. Careful distinctions between Class 1 (basic) and Class 2 (enhanced services) carriers, and among types of value-added networks, have created a predictable environment: firms can calculate their interests and seek the appropriate licenses. Meanwhile, given uncertainties as to what the new rules in the United States will be, the RHCs have been scrambling for new markets and testing the bounds of the permissible. In France, even though most telephone and data services

Table 52.—Telecommunications Regulations Compared

	United States	Japan	France	United Kingdom	Federal Republic of Germany
Public monopoly	No	No	Yes	No	Yes
Geographic basis for regulation	Regional	National	National	National	National
Regulatory separation between basic and enhanced services?	Currently, yes	Yes	Yes	Limited	No
Competition in long-distance service?	Yes	Yes	No	Yes	No
Competition in value-added services?	Yes	Yes	Yes	Yes	Some

SOURCE Off Ice of Technology Assessment, 1987

remain under state control, competition in information services has been only lightly regulated. Judicious use of public funds to subsidize installation of Teletel/Minitel terminals spurred growth in the French market for enhanced services. Again, the lesson seems straightforward: regulations need not stifle innovation and market forces; competition flourishes when the rules are clear.

Standards

Government participation in determining product, technical, and professional standards has a dark side and a light side, Sometimes governments manipulate standards or professional licensing requirements to create NTBs; Japan's product standards have been a sore point with other governments for years .16 In other cases, international agreements on technical standards can help create regional or world markets in place of fragmented national markets, Table 53 lists common NTBs in the services fostered by national standards and licensing requirements; many more examples could be cited.

Technical Standards

If national standards can act as NTBs, international standards can help to open markets—which does not mean that countries will be able to agree. Electrical outlets illustrate the problems. Hundreds of different designs for plugs and sockets exist around the world. Different countries use different voltages. National bodies for setting standards often exclude foreign firms. The result? Domestic appliance manufacturers typically have a slight cost advantage. After more than a dozen years, international discussions have ended with no progress toward agreement on a universal standard.[17]

Table 53.—Standards and Licensing Requirements That Can Serve as Nontariff Barriers

Sector	Possible barriers
Construction	Building and material standards
Telecommunications	Potentially differing ISDN systems, modem signal speeds, network protocols, incompatible system architectures
Financial services	Access to clearing systems (CHIPS and CHAPS, ch. 3) or giro payment systems
Law	Bar admissions; limitations on type of practice
Architecture, engineering	Licensing of foreign professionals

SOURCE Office of Technology Assessment, 1987

Sometimes, of course, international standards do emerge: 1) in the absence of, or in spite of, the policies of governments; 2) because one or more governments adopt standards that become a clear choice for technical reasons; or *3)* as a result of cooperation among governments and firms in international standard-setting bodies, Examples of the first case include the IBM PC as a de facto standard. While many companies independently bought large numbers of IBM PCs, the MAP (Manufacturing Automation Protocol) standard for linking factory automation equipment stems from the initiatives of a single major purchaser on the world

[16]See, f. r exa m ple, D, Chri stel O\\". "Japan's intangible Barriers to Trade in Manufactures," *Federal Reserve Bank of New York Quarterly Review*. winter 1 985-86, p. 11.

For the United States alone, the Nation [i] Bureau of Standard's d a t a base n ow i n cludes more than 30,000 ire] u n tary technical standards. ']>h e Bu reau a] so serves as a focal poi n t for i n formation and complaints on foreign standards.

[17]J. Callcott, "A World-Wide Plug Faces Disconnection After 74-Year E f fort," *Wall Street Journal*, Apr. 1, 1982, p. 1,

market—General Motors (GM). MAP has now been accepted by several hundred other firms. Suppliers of both equipment and parts must go along if they expect to sell to GM. Prospective purchasers have adopted the standard because they know a great deal of MAP-compatible equipment will be available, None of this would have happened, of course, if MAP had not received wide acceptance as a reasonable choice on technical grounds. With the International Organization for Standarization (ISO) now involved, the eventual outcome may be a global standard.

National governments have sometimes acted unilaterally to establish standards for computer languages. Several international standards have come about largely because the U.S. Department of Defense first imposed them on military contractors—an example of the second case listed above. DoD now hopes that Ada will replace most of the 400 or so languages currently in use for defense systems.[18] In some contrast, the Japanese Government sought to make MSX a standard for operating systems in small home computers. While MSX had considerable success in Japan, it has not been accepted elsewhere. Currently, the West German Government is trying to establish a global standard for ISDN that will benefit the leading German equipment manufacturer, Siemens. To have much chance of success, the Federal Republic will have to convince other EC countries to go along. This may happen: the Society for Worldwide Interbank Financial Telecommunications (SWIFT) was able to set formatting standards and protocols for communications among member banks in part because a number of governments backed SWIFT rather than competing U.S. proposals. In doing so, they relaxed their own rules governing interfirm telecommunications services.

Individual companies and national industries can reap substantial benefits if they get their standards adopted internationally, but this usually takes a strong market position to begin with, As the MAP example illustrates, for others to accept a standard, they must perceive benefits for themselves. But given enough market power, big firms or the governments of powerful countries can sometimes establish standards that would not survive marketplace tests, or that are not at the technological frontier. Such an outcome can—like premature establishment of standards, or unduly restrictive technical specifications–foreclose desirable technological paths. These are real dangers, although often exaggerated by those opposed to standards for other (e. g., commercial) reasons.

Many international bodies provide forums for discussing standards. One of the oldest, the World Postal Union, originated in efforts to reduce incompatibilities in national mail systems. The International Telecommunication Union (ITU) grew out of the International Telegraph Union, founded in 1865. In addition to these more specialized bodies, committees within organizations like the OECD also provide forums for standards setting. The Tokyo Round GATT negotiations led to a new code (the Agreement on Technical Barriers to Trade) that counts as a small step toward making it more difficult for governments to use standards as NTBs.[19]

Perhaps the most important recent attempt to create an international standard began with a group of companies seeking an alternative to IBM's Systems Network Architecture (SNA) for linking computers. Their Open Systems Interconnection (OSI) alternative is important for two reasons: 1) network architecture and interconnection standards will be central to the design of the next generation of mainframe computers, and also to the telecommunications infrastructure (especially ISDN); and 2) many of the European participants have sought to define an OSI standard that would eliminate some of the advantages IBM now gets from its dominant position in the world market for large computer systems. General Motors' MAP standard is itself an OSI variant.

[18] Probably a vain hope—see J. Jacky, "Ada's Troubled Debut, " *The* Sciences, January 1987, p. 20. DoD spent something over $10 billion in 1985 for mission-related software, more than five times its hardware costs—E.J. Joyce, "SE]: The Software Battleground," *Datamation*, Sept. 15, 1986, p. 109.

[19] *International Competitiveness in Electronics*, op. *cit.*, pp. 436-437.

After some 10 years of deliberation in forums including the ISO and the ITU's Consultative Committee for International Telephone and Telegraph (CC ITT), the OSI standard gathered enough adherents that even IBM has begun to offer OS I-compatible equipment. The complex seven-layer specifications would arouse little controversy in the abstract, but on specifics the participating computer and telecommunications firms disagree; resolution of details inevitably works to the advantage of some, the disadvantages of others. Furthermore, some computer manufacturers—notably IBM—felt that they were being asked to supply proprietary information. IBM's reluctance to be too specific about its own systems encouraged the (perhaps not unrealistic) paranoia of other companies, In fact, the slowness with which IBM released technical details on SNA became a major factor in the ongoing dispute between IBM and the European Community, figuring in the settlement of the EC's antitrust suit against IBM.[20]

The stakes will be still higher for ISDN standards, with strong temptations for public telecommications authorities to implement ISDN in ways favoring domestic suppliers. The German Bundespost's efforts to help Siemens may simply be the first of many such attempts. As for OSI, the motives lie mostly in competition for hardware markets, not services. With competition in international markets for telecommunications equipment fierce, more companies are chasing business than can expect to survive. This strengthens the resolve of governments to help "their" firms, some of whom may not get a second chance if they lose out in early rounds of competition for ISDN sales,

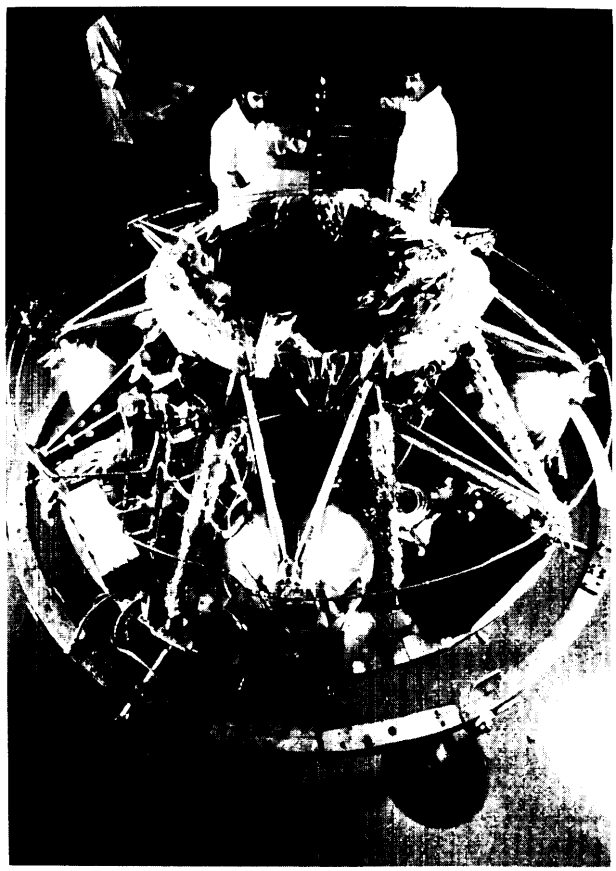

Photo credit: AT&T Bell Laboratories

Communications satellite under construction

Professional Licensing

While licensing standards for lawyers, engineers, architects, and other professionals may at first seem quite different from technical or product standards, they function in rather analogous fashion, On the one hand, they provide information for customers; on the other, they limit market entry and raise costs for those who wish to compete,

[20] On OSI and its relationship to proprietary}, network architectures, see A. Meijer and P. Peeters, *Computer Network Architectures* (Rockville, MD: Computer Science Press, 1982) and *Future Information Technology—1984: Telecommunications* (Washington, DC: National Bureau of Standards, 1984), ch. 1. The seven layers range from connector designs at the physical interface (layer 1) to an application-specific layer (number 7).

The recently organized Corporation for Open Systems (COS), a nonprofit group of American and some foreign computer and telecommunications firms, represents the latest step in attempts to agree on networking standards. Although originally viewed as something of an anti-IBM coalition, I B M has now joined; with so many IBM computers in use, even that firm's biggest competitors felt they could not afford to leave IBM out of efforts to establish industry standards. See A, Pollack, "Computer Makers Seeking Standards, " New *York Times*, Jan. 6, 1986, p. D4; "IBM Joins Group for Standards on Interconnection," *Electronic News*, Feb. 10, 1986, p. 16. The COS will support the OSI standard.

Professional licensing places a floor under expertise. Indeed, given the problems consumers face in evaluating the expected quality of service products such as medical care or legal advice, professional licensing has a vital role in the marketplace. But licensing can easily be turned to the creation of unfair entry barriers. It took 4 years of negotiations between the U.S. and Japanese Governments before Japan agreed to loosen its restrictions on foreign lawyers; because foreign-owned firms will not be allowed to hire Japanese attorneys or to give advice on Japanese laws, ample grounds for complaint remain.[21] Other professional services—e. g., accounting—provide similar examples of credentials and certification requirements serving as NTBs; many countries, for instance, routinely deny visas to professionals who do not hold locally valid credentials.

Intellectual Property Protection

Counterfeiting—of clothing, auto parts, pharmaceuticals, personal computers with false or misleading brand names and trade marks—has become a big business.[22] So has illegal copying of books, audio recordings, movies, videotapes, and computer soft ware. In many countries, weak laws and lax enforcement mean that none of the usual instruments—patents, copyrights, trademarks—provide much protection for intellectual property rights. With most of the counterfeiting and copying taking place in LDCs and NICs, the industrialized countries have a common interest in seeking stronger protection. Most of the problems in services arise in information-related products—audio and videotapes, databases, computer software.

Pirating of books has been a major industry in countries like Singapore for years; it is no surprise to see the pirates moving on to software, But why has intellectual property protection become a new issue in the Uruguay Round? In part because of new technology, as explained in box GG. As long as most computer programs ran on expensive machines, illegal copying remained a minor problem. With low-cost PCs opening a mass market, counterfeiters not only sell fakes that resemble IBM and Apple hardware, they also copy and sell software for these machines. Illegal copying by individual users has also been widespread. With no technical means for reliably preventing copying likely to emerge, the problem remains one for the legal system (or the market).

Services supplied over the telecommunications infrastructure raise similar issues. An online database—consisting, say, of news stories—might not at first sight appear too different from the print media on which it draws. But it is, largely because the database, like fourth-generation software, has a form that is fluid rather than fixed. Copyrights were intended for works like books, musical compositions, and motion pictures; how can information be registered and protected when the database changes every day?

Meanwhile, as pointed out in box GG, some developing countries, and a few in the industrialized world, have considered or taken steps to relax, rather than strengthen, intellectual property rights. Weak forms of copyright / patent protection have been proposed in Mexico, Brazil, and Japan. The motives are straightforward: to make it easier for domestic firms to take advantage of foreign technology. While the Japanese copyright proposal for software was

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[21] The new regulations will be enforced by Japan 's Department of Justice, See "Foreign Attorneys' Practice in Japan, Other Services Issues Focus of Chicago Conference, *International Trade Reporter,* Feb. 12, 1986. Also, T. Lewin, "Lawyers Await Japanese Rules," *New York Times*, July 29, 1986, p.D2.

[22] While estimates for U ,S. sales of counterfeit goods, almost all imported, run well into the tens of billions of dollars, there is little agreement on the actual size of the counterfeit goods market. See A.M. De Stefano, "Customs Agents Fight Often-Losing Battle Against Illegal Imports: Up to $40 Billion of Fakes, Contraband Enter Yearly, Some Experts Estimate, " *Wall Street journal,* Jan. 28, 1986, p. 1; and B. Stokes, "Intellectual Piracy Captures the Attention of the President and Congress, " *National Journal,* Feb. 22, 1986, p. 443. On efforts to control illegal imports, see *U.S. Firms Views on Customs Protection of Intellectual Property Rights,* GAO/NSIAD-86-96 (Washington, DC: U.S. General Accounting Office, May 1986); and D. Hebditch, "Pirate's Paradise, " *Datamation,* Sept. 1, 1986, p. 71. On the general problem, see *Intellectual Property Rights in an Age of Electronics and Information* (Washington, DC: Office of Technology Assessment, April 1986).

The major offenders, according to most accounts, include Singapore, Taiwan, Indonesia, South Korea, the Philippines, Malaysia, Thailand, Brazil, Egypt, and Nigeria—C. H. Farnsworth, "U.S. Plans To Defend Its patents," *New York Times,* Apr. 7, 1986, p. 1)1.

Box GG.—Protecting Intellectual Property

In general, intellectual property can be protected as: 1) a work of art (motion pictures); 2) a work of fact (encyclopedias, computerized databases); or 3) a work of function (inventions, technological know-how).[1] Patents, not copyrights, have traditionally protected works of function.

Systems of Intellectual Property Protection

As pointed out in chapter 6, there is **no such thing as an internationally valid patent, trademark, or copyright: each nation administers its own system. In many countries, copyright and patent laws have evolved side by side with international agreements like the Berne Convention for the Protection of Literary and Artistic Works, the Universal Copyright Convention, and the Paris Convention. While the United States has never joined the Berne Convention, it is one of 96 members of the Paris Convention, the oldest international treaty on patents, trademarks, and unfair competition.**

Legal protections for intellectual property tend to be similar among the industrialized nations; American businesses have become familiar with them, feel able to work with or around them, and generally believe them adequate. It is in the LDCs and NICs that lack of effective intellectual property protection has led to competitive difficulties for U.S.-based firms. Some countries rationalize weak protection for intellectual property in the name of low costs for consumers. It seems clear, however, that policies in many of the LDCs have been structured to help local firms acquire foreign technologies as quickly and cheaply as possible. Indeed, developing countries—primarily the Group of 77—have been seeking *reduced* levels of intellectual property protection in several multilateral forums, claiming that this is justified to redress the imbalances they perceive between technology haves and have-nets.[2] Many LDCs question the view that private ownership of technical knowledge leads to efficiency in economic development processes; they feel that protection for intellectual property hurts them while benefiting foreign-based MNCs.

Intellectual Property as a Trade Issue

In the past, intellectual property rights have seldom been viewed as trade-related matters like tariffs or subsidies. This has changed over the last few years, as complaints over counterfeiting and piracy have escalated. In the United States, the issue has caught the attention of the Economic Policy Council in the Cabinet, as well as Congress. The Trade and Tariff Act of 1984 makes protection for U.S. intellectual property rights a factor in decisions on renewal of agreements under the Generalized System of Preferences. Among bills in the 100th Congress, both H.R. 3 and S. 490 address the international dimensions of intellectual property rights. Moreover, the Semiconductor Chip Protection Act passed in 1984 extends protection to foreign parties only if their home country makes good-faith efforts to reciprocate.

National treatment has been common in intellectual property protection—meaning that foreign parties are to be on the same footing as residents. In fact, overt discrimination has never been common; one result of national treatment is to help perpetuate the uneven levels of protection that have existed. At the moment, then, perhaps the greatest need is for harmonization in intellectual property protection—not an easy task given the unwillingness of some countries to control copying and counterfeiting. Some do not subscribe to international regimes; others ignore them. In part because of disillusionment with WIPO and UNCTAD, the United States and other developed nations have turned to GATT in search of relief—a step that developing countries have resisted, arguing that intellectual property issues belong exclusively in WIPO.

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[1] See *Intellectual Property Rights in an Age of Electronics and Information* (Washington, DC: Office of Technology Assessment, April 1986), pp. 65-88. The rising number of cases brought before the U.S. International Trade Commission, rather than patent courts and other specialized tribunals, illustrates the increasingly political nature of trade-related conflicts over intellectual property rights.

[2] Within the World Intellectual Property organization (WIPO), a United Nations body that now administers the Paris Convention, the LDCs have proposed compulsory licensing and patent forfeiture requirements, The Code of Conduct on the Transfer of Technology prepared by the United Nations Conference on Trade and Development (UNCTAD) would forbid business practices such as restrictions on exporting by licensees. See ***Preserving America's Industrial Competitiveness: A Special Report on The Protection of Intellectual Property Rights*** (Washington, DC: President's Commission on Industrial Competitiveness, 1984), pp. 35-37.

While multilateral forums like WIPO do provide a venue for discussion, such bodies are unlikely to take meaningful action. Given problems of some urgency in fast-moving industries like software and information services, U.S. negotiators will need to involve WIPO but cannot depend on it for progress. Bilateral negotiations will probably prove more fruitful, at least in the short run. Indeed, in the case of South Korea, they already have. After extended negotiations, Korean officials agreed to implement stronger patent and copyright protections.[3] Progress bilaterally can help lay groundwork for more comprehensive multilateral agreements, in GATT or elsewhere. But protection for software poses still knottier problems, because traditional mechanisms have proven inadequate for technical reasons.

Computer Software

None of the familiar categories of intellectual property protection fit software comfortably; because computer programs have high development costs but low production costs, and can be easily duplicated, unauthorized copying is common–particularly for the standardized programs that run on small machines. Piracy and counterfeiting have become a major concern for U.S. software producers, both at home and abroad; ADAPSO, the trade association of computer software and services firms, claims that unauthorized copying cost the American industry $800 million in lost revenues in 1985. At present, American software companies lead the world; without better control over illegal copying, their future competitiveness could be harmed. The special problems of protecting software-and its significance-make this something of a test case for the evolution of the intellectual property protection system.

Of the two routes to protection, technical means—supplying programs in such a form as to make copying impractical or impossible-have consistently proved ineffective. Software pirates quickly find ways around new protective schemes, no matter how ingenious, just as car thieves manage to keep stealing automobiles; indeed, a copy-protection defeating industry exists.[4] Moreover, corporate customers have tended to oppose the technical schemes because of their inconvenience. Legal means, the second route to protection, seem to offer the only hope of a practical solution. The problem is that neither the laws governing patents and copyrights, nor the administrative procedures for enforcement, were designed with products like software in mind.

In effect, software falls between the stools of patent and copyright law. Of the three types of intellectual property--works of art, fact, or function-computer programs would be classed most naturally as works of function. However, they do not fit this class in a legal sense, generally failing tests based on prior art and tangible physical form. U.S. courts have held that patents can only be granted for programs that implement physical operations-e.g., running a typesetting machine or a numerically controlled machine tool. Although many such applications exist, and patenting of programs has been rising, such applications account for only a tiny fraction of all software.

Patents, where granted, protect the functional aspects of the program—what it does, rather than the code that implements the program's functions. Under U.S. law, software can be protected through copyright as a form of writing or work of art; but in this case the copyright protects the written or coded program, not its function or its logical structure. Because the same functions can be coded in many ways—indeed, there maybe an almost infinite set of program codings (and logical structures) that will yield a functionally equivalent software package-protecting only the code accomplishes little. With effort, others can duplicate what the program does without duplicating the coding.

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[3] S.B. Butler, "US and S. Korea Resolve Trade Disputes," *Financial Times*, July 22, 1S86, p. 6. Under previous Korean laws, for example, chemical and pharmaceutical products could not be patented. Also see "U.S. Plans To Defend Its Patents," New *York Times*, April 7,1986, p. D1.

[4] See, for example, J. Taylor, "The Copy Protection Wars," *PC Magazine*, Ian. 14, 1966, p. 165; also P.B. Gray, "A Software-Lock Breaker Becomes A Hero to Some, a Villain to Others," *Wall Street Journal*, Feb. 27,1986, p. 23. On uaer opposition, see V. McClellan, "Padlock Copy Protection: End of an Era," Digital Review, Sept. 1, 19S6, p. 64.

Gradually, then, legal decisions have been accumulating that extend copyright protection to the functions available to users. Currently, an infringement suit can be brought if someone else's software closely resembles, from the user's viewpoint, the copyrighted products This is a limited step, in part because software is evolving in the direction of programs that users can modify to suit individual requirements (fourth-generation language s, ch. 5). If customers can define or change the function of purchased software, will it be possible to protect the functional features? At present, there seems no easy way out of such dilemmas; in any event, copyright law in much of the rest of the world has hardly begun to confront them.

[5]E. Lach, "Court Backs 'Look & Feel' Copyright, " *Infoworld, Oct. 20, 1986,* p. 1; W.M. Bulkeley, "Courts Expand the Copyright Protection of Software, but Many Questions Remain," *Wall Street Journal, Nov. 18, 1986,* p, 35; D. Stipp, "Lotus Suit Charges Two Software Firms Infringe on 1-2-3 Program Copyrights," *Wall Street Journal,* Jan. 13, 1987, p. 8.

ultimately defeated because of protests from domestic as well as foreign software suppliers, the Mexican and Brazilian laws still stand.

On the other hand, recent concessions by South Korea—a notorious offender—show that progress is possible (see box GG). The agreement, which took several years to negotiate, also suggests the dimensions of the problem. Bilateral negot ations are expensive and time-consuming, A dozen other countries have been equally blatant offenders. Dealing with them on a case-by-case basis, rather than in multilateral forums, puts considerable strain on the responsible U.S. agencies. And, in countries where governments have tolerated piracy and illegal copying for years, enforcement may be more important than the letter of the law,

INTERNATIONAL NEGOTIATIONS

The United States has many competitive strengths in the services, starting with an unmatched base in information technologies. The first step in maintaining the Nation's competitive position is simply to continue the policies that have helped foster past growth—policies that range from promotion of competition through vigorous antitrust enforcement to support for research in technology and science, In an increasingly interdependent world economy, however, domestic measures will not by themselves suffice. Nor will trade negotiations within GATT, no matter how successful. Negotiations in other forums will also be needed,

Reasons for pursuing issues related to the services in forums outside GATT begin with the need to improve GATT discipline over trade in goods. Pushing too hard for a services agreement might endanger progress on the goods track. Despite attempts to separate them, and despite the two-track agenda for the Uruguay Round, goods and services will remain linked in the eyes of many countries. When it comes to the services, it is possible that negotiations will move beyond general questions to sector-specific issues, If they do, some nations will seek concessions on goods trade in exchange for concessions on services.

In any case, a GATT umbrella agreement on services should make progress easier in other multilateral forums and in bilateral talks (where the U.S.-Israel Declaration on Trade in Services may also provide a model for future agreements). Although the choice of forums for supplementary discussions will itself become a matter for negotiation among governments—and among agencies within the U.S. Government—there are a priori reasons for suggesting that GATT and the OECD will remain the appropriate places for issues of trade and investment flows, that specialized bodies like the CC ITT offer the best prospects for agreements

on technical standards, that export subsidies and mixed credits are a matter for the OECD, and so on.

GATT and the Uruguay Round; Other Forums

While the United States has laid solid groundwork for discussions on the entire range of new issues within GATT, resistance on the part of developing countries will continue as the Uruguay Round unfolds. Few of these countries have developed more than a vague sense of their interests; the strong stand of the United States, and now Japan and the EC, heightens suspicion that concessions on services and other new issues will be to the disadvantage of the Third World, As developing countries focus on the substance of the negotiations, analyzing the potential benefits of liberalization, some of their suspicions will be dispelled. But if pragmatism will overcome some objections, it will not be enough when these objections have roots in ongoing strategies for economic development. LDCs and NICs will continue looking to import substitution and export-led growth as paths to industrialization and an improved position in the world economy; they will continue to resist efforts to lower barriers that shelter firms and industries they regard as vital for development.

Given continuing Third World opposition—some of it stemming from desire to slow the inroads of Western cultures, some from traditional reliance on regulatory practices that create quasi-NTBs, some from long-held development objectives—the United States and the other industrial countries may have to turn to forums that do not require the consent of developing countries. When it comes to narrower questions, bodies outside GATT not only have a well-established place but may offer better prospects for reaching agreement. Table 54 gives a possible schema for matching issues and forums. The OECD, for example, could provide something of a parallel to GATT for the more general issues; indeed, several OECD codes are being revised to integrate services more fully. Moving ahead in the OECD (or bilaterally) while the Uruguay Round is in progress risks resentment in developing countries if they feel unable to influence the new regimes being negotiated; even so, this could be a prod to substantive negotiations within GATT.

Moreover, bilateral negotiations on services-related issues between the United States and such major trading partners as Japan, Canada, and the members of the EC will be needed no matter the progress in GATT. There can be no simple formulas for such talks. Rubrics like national treatment and reciprocity put forth in the past have not proved very useful in finding common ground for resolving long-lasting conflicts; nor have these general principles proven of much value in defending U.S. interests in specific cases. Nonetheless, greater harmonization of policies affecting services will clearly remain a primary aim of U.S. negotiators.

Toward a Better Linkage of Foreign and Domestic Policy

When it comes to negotiating with other governments, the United States must live with a real disadvantage: the lack of a coherent institutional structure for arriving at bargaining positions and determining who will do the negotiating—a longstanding and much-noted aspect of U.S. trade policy, Talks on services will bring new complications where they touch on matters under the jurisdictions of regulatory agencies that have usually been well-removed from international deliberations and international responsibilities,

The Office of the United States Trade Representative (USTR) shares the responsibility of preparing for trade talks with the Department of Commerce, as well as the Departments of State and Treasury. A panoply of agencies—the Federal Reserve Board, FCC, Department of Justice, Federal Trade Commission, among many others—play a role in domestic decisions that have direct or indirect impacts on the international competitiveness of U.S. industries, and, potentially, on U.S. negotiating positions. Some of these agencies have responsibilities that extend to international matters; others have largely domestic horizons. In the absence of careful White House scrutiny, and continuing supervision, U.S. policies can easily become incoherent and stay that way.

Table 54.—Examples of Issues and Forums Relevant to the Services

	GATT	OECD	Other
Trade barriers	✓		United Nations Council on Trade and Development (UNCTAD)
Investment barriers	Trade-related	✓	Economic summits; United Nations Commission on Transnational Corporations (UNCTC)
Transborder data flow restrictions	✓	✓	UNCTC
Government procurement regulations	✓	✓	
Export credits	✓	✓	UNCTAD
Intellectual property	✓	✓	WIPO[a]
Technical standards	✓	✓	International Organization for Standardization (ISO); ITU (including CCITT and WATTC)[b]

KEY GATT = General Agreement on Tariffs and Trade,
OECD = Organization for Economic Cooperation and Development;
WIPO = World Intellectual Property Organization,
ITU = International Telecommunication Union

aNow affiliated with the United Nations

bThe CCITT (Consultative committee for International Telephone and Telegraph), a permanent ITU body, makes recommendations on technical standards The WATTC (World Administrative Telephone and Telegraph Conference) meets on occasion to consider changes in ITU regulations

SOURCE Office of Technology Assessment, 1987

The need to develop and present a consistent U.S. position will become, if anything, more pressing if the Uruguay Round moves on to sector-specific deliberations—e. g., for services like telecommunications, where other forums have established and ongoing roles. Thus the U.S. position at upcoming ITU meetings (table 54) will need to be closely coordinated with any sector-specific discussions on telecommunications that might be underway in GATT. The ITU has scheduled a plenary session of the CC ITT during 1988, along with a World Administrative Telephone and Telegraph Conference (WATTC) meeting–the first since the early 1970s. These will be followed by a plenipotentiary meeting of the ITU in 1989. When it comes to the ITU, the State Department has the job of developing and presenting the U.S. position —with substantive policy input from other agencies, and extensive consultation with the private sector, This task has become much more difficult with the breakup of AT&T. Not only do several Federal agencies need to be involved —State, the FCC, USTR, Commerce's National Telecommunications and Information Administration—but literally hundreds of U.S. firms now have a stake in ITU decisions.

It has become trite for reports like this to suggest remedies such as more effective coordination by the Executive Office of the President or consolidations of existing agencies (e. g., a department of international trade and industry). Nevertheless, even those who regard such proposals as unrealistic must admit that the problems are real ones, and sometimes have serious consequences for U.S. foreign economic policy. Services, as a new issue on the national agenda, may offer an opportunity for Congress and the executive branch to consider a somewhat less chaotic set of arrangements—a question to which the next chapter returns,

CONCLUDING REMARKS

The United States comes to the new GATT round in an impressive position. The international competitiveness of American service firms remains generally high; the size of the U.S. market makes the threat of restrictions on foreign access a powerful negotiating weapon.

But the Uruguay Round also poses a major challenge for U.S. leadership. As the United States continues to impose ad hoc restrictions on imports of goods, gaps between action and rhetoric become harder to paper over. Developing countries will not be likely to accept liberalization of services trade accompanied by continued closing of markets for the labor-intensive goods they must export in order to grow and to service their debt. Nor does the United States, today, necessarily have the economic muscle to get its way.

The background prospect of a surge of protectionist sentiment in the United States, or reciprocity legislation, may deter some of the more objectionable forms of protectionism in other countries, and help bring them to the bargaining table. But given the nature of the problems afflicting the international trading system, more may be needed than bargaining as usual. When it comes to intellectual property rights, for example, the United States has been successful with South Korea, as well as in getting the issue onto the Uruguay Round agenda. Meanwhile, various bills have been proposed to penalize countries that fail to recognize the rights of U.S.-based firms. Some bills would set time limits for negotiations with offending countries; if an acceptable agreement could not be worked out, the President would be expected to apply countermeasures of one sort or another. Others would prescribe specific negotiating objectives. But the greater need seems to be for a U.S. strategy aimed at establishing a new regime for intellectual property protection—one better suited to current and emerging technologies. Developing such a strategy might take a good deal of analysis and planning before negotiations began.

International technical standards provide another sort of illustration of the shortcomings in the U.S. approach to foreign economic policy. This country does not always have a good grasp of what is at stake when it comes to such questions. To many people, the standard-setting process seems opaque, the technical questions a mystery. Many of the firm-specific or country-specific interests remain hidden. International negotiating forums are slow-moving and perplexing, if not byzantine.

It is certainly true that those who set broad policy goals will seldom need to concern themselves with the details of standards; still, in the United States, the policymaking community has perhaps underestimated their significance for international competition, particularly with tariff barriers largely down and NTBs taking their place. Although the subject is esoteric compared to quotas for steel or subsidies for agricultural products, conflicts over OSI standards have already done real if minor damage to U.S.-European relations.

The point is a more general one: leaving aside national defense, the U.S. policymaking community seldom shows much interest in or understanding of technical matters. Finding new ways of protecting intellectual property rights inevitably raises questions that demand some appreciation of the technologies involved in, say, fourth-generation computer languages. So does grasping the stakes involved in negotiations over ISDN standards,

The possibilities for U.S.-European and U. S.-Japanese cooperation on R&D related to communications and information technologies (or further cooperation in space) provide a further example of the increasingly technical character of matters that, most fundamentally, remain in the realm of foreign policy or international economic policy. Cooperation might help reduce tensions among the major industrial countries, as well as unnecessary duplication in research. Cooperation on, say, R&D or demonstration projects for ISDN would be easier to arrange (and probably more productive) if limited to industrialized nations. But participation by Third World countries could help reduce the suspicion that initiatives aimed at liberalizing services and high-technology trade would necessarily work to their detriment, Including developing countries in multinational development projects could become an incentive for cooperation on other fronts. The Third World has strong interests in not being relegated to the margins of technology trade; these interests create opportunities for liberalizing

the world trade regime (as well as impediments). The United States, however, has had little experience in developing such programs, or in managing them so they function effectively.

Fundamental conflicts of interest, as well as lagging understanding by some countries of what they might gain, slowed the process of laying groundwork for the new MTN round. The talks themselves promise to be the most difficult in GATT's 40-year history, USTR has been at the center of U.S. efforts to pursue services liberalization since the beginning. The agency will be stretched for resources as the Uruguay Round proceeds, and as services issues proliferate in other forums and bilaterally.

With international negotiations dealing with specific sectors arising alongside those on broader principles, USTR will have to rely on staff work by other agencies. These agencies, in order to provide effective support, will have to quickly come up to speed as specialized problems surface. U.S. representatives will have to be flexible in their choice of forums—and in coordination of negotiations—and careful to appreciate the underlying development strategies of other countries. Advisory processes will probably need restructuring. At present, USTR works with 14 Industry Sector Advisory Committees (I SACS) representing manufacturing industries, but only two groups drawn from the services. The farther negotiations move beyond general principles to sector-specific issues, the greater will be the need for new ISACs to speak for service industries and their employees. The next chapter discusses both resources for USTR, and advisory mechanisms, in more detail.

Among U.S. handicaps as the new round begins, two deeply rooted attributes of the Nation's policymaking system stand out: 1) reliance by the Federal Government on military spending, almost exclusively, to stimulate technological development; and 2) dispersed decisionmaking authority when it comes to regulatory and trade policies, GATT has been successful in reducing tariff levels, somewhat less so in controlling other direct barriers to trade (e. g., quotas). Meanwhile, countries around the world have been turning to indirect and less visible policy instruments: subsidies, discriminatory regulations, the entire array of tools associated with national industrial policies. Certainly, U.S. negotiators have had success in dealing with some of the indirect barriers—e. g., convincing the Japanese to let in foreign lawyers. But in a more general sense, the United States finds itself increasingly unable to respond. We have no tradition of explicit industrial policy, thus cannot credibly threaten to provide concerted support for U.S. firms internationally; other countries know that any policy extending such support would be subject to reversal on short notice. At a minimum, achieving U.S. goals on services and other new issues in the Uruguay Round will demand careful attention to the management of jurisdictional overlaps within the Federal Government, particularly where domestic regulatory policies and foreign economic policy come together, Beyond this, the many Federal agencies whose policies affect the competitive ability of U.S.-based service firms—either directly or as side-effects of domestic regulatory policies—will need to take greater account of these impacts in the future, a point stressed in the next chapter,