CHAPTER 15

Options for U.S. Policies Affecting Technology Transfer

Contents

Page

POLICY TRADEOFFS. 581

Controls v. Commerce 582
The Role of Technology Transfer in Foreign Aid 585
Economic Assistance and Commercial Promotion 586
The Costs and Benefits of Commercial Promotion Policies 587
The Promotion of Technology Transfer Through Commercial Policies 589

POLICY PERSPECTIVES. 589

Perspective 1: Selective Use of Technology to Promote Political Interests 590
Perspective: Decouple Commercial Technology Trade From Political Interests. 591
Perspective; Promote Civilian Technology Transfer 592
Conclusion 593

CHAPTER 15

Options for U.S. Policies Affecting Technology Transfer

The United States has no coherent policy governing civilian technology transfers to the Middle East, despite the fact that Congress has considered a number of proposals to establish one. [1] In the future, the Islamic Middle East will remain an important market for civilian technology trade, even if oil revenues grow more slowly than they did in the 1970's. The question is whether the United States can or should attempt more consistently to affect technology transfers to the region. The purpose of this chapter is to identify, in light of OTA's research, options available to policymakers in the next decade.

Although U.S. policies have not been systematically formulated to influence technology trade, many nevertheless do affect technology transfer. As analyzed in chapter 13, three major objectives of such policies have been commercial promotion, assisting countries in their development efforts, and limiting certain types of technology exports for military and political reasons. In recent years, these various objectives have all been pursued in an ad hoc fashion. The result has been an inconsistent set of policies affecting technology trade and transfer and an expansion of controls on exports. The dilemma for policy makers is that by pursuing one objective it becomes less possible to maximize others. Nevertheless, the absence of a strong consensus on priorities has resulted in this ad hoc approach.

Because U.S. technology trade with the Middle East has been strongly influenced by politics in recent years, it is unlikely that piece meal changes taken with the goal of enhancing any one of the three major policy objectives would have strong effects on overall patterns of technology trade and transfer. Only a more consistent foreign policy perspective, which would drive policies affecting trade and transfer, would be likely to affect significantly the overall direction and nature of technology trade. This chapter outlines three policy perspectives that could be promoted in order to achieve the more ambitious goal of strongly affecting patterns of technology trade and transfer. These include: 1) selective use of technology to promote political interests; 2) decoupling technology trade from politics; and 3) promoting civilian technology transfer. OTA's analysis leads to the conclusion that it would be difficult to establish a consistent technology trade policy without a consensus on overall foreign policy goals.

[1] See, for example, House Committee on Science and Astronautics, Subcommittee on International Cooperation in Science and Space, *International Science and Technology Transfer Act of 1974,* hearings, May 21-23, 1974.

POLICY TRADEOFFS

Congress has an interest in ensuring that economic assistance programs involving technology transfer are effective, that U.S. firms are free to compete on equal terms for sales in developing country markets, and that civilian technology transfers do not run counter to military and foreign policy goals. While each of these objectives has its virtues in the abstract, the dilemma has been that steps required to strengthen one require tradeoffs with others. In the discussion that follows, major tradeoffs are reviewed.

CONTROLS V. COMMERCE

During the past decade, controls on civilian technology exports have been expanded in order to achieve a variety of military and political goals. The institution of controls on exports of advanced civilian technologies generally implies a tradeoff with commercial interests. The essential debate is therefore between those who favor restricting exports for military or political reasons and those who point to the chilling effects on trade. The use of controls heightens the political dimension of technology trade, particularly when individual nations are singled out for special treatment in the absence of an international crisis that would obviously justify such measures.

Controls of all types are susceptible to criticism on two grounds: disproportionate commercial sacrifice and ineffectiveness in achieving political goals. On the other hand, proponents of controls view the effort to achieve national security and foreign policy aims as worth the commercial sacrifice. In some instances, where it would be inappropriate for the United States to use military force to achieve political objectives, proponents of controls argue that trade is a valuable lever, and sometimes the only arena in which action can safely be taken. In their view, even if controls are not completely effective in achieving desired results, they make the position of the United States clear. On the other hand, opponents of controls point to what they see as the limited effect that restrictive U.S. export policies may exert in the absence of coordination with other Western supplier governments. Because a number of suppliers can generally provide comparable advanced civilian technologies, the United States is not in a position unilaterally to control access. OTA's research indicates that West European nations and Japan are not willing to institute controls on civilian technology trade with the region.[2] However, proponents of controls would argue that the United States should not allow other nations, even allies, to dictate its policies.

As discussed in chapter 13, U.S. policymakers have introduced controls of various types affecting technology transfer to the Middle East. Some of these controls apply only to trade with Middle Eastern countries, while others apply more generally to exports worldwide. The United States has used controls on trade more often than any other nation, and these controls have been deployed more frequently with each passing decade.[3] The expansion of controls on trade with various Middle Eastern nations has been particularly noticeable in recent years.

National Security Controls

National security controls, which restrict militarily significant exports to Soviet bloc nations, affect Middle East nations (except Libya[4]) as they do all nations not included in the Soviet bloc. Few question the need for national security controls or those covering military exports, but debates continue concerning the definition of "military significance' and concerning the treatment of non-Communist nations.

Congress has considered a number of proposals to extend controls governing dual-use items (i.e., products with both military and civilian uses) such as large-scale computers, certain kinds of materials testing equipment, and items used for the production of special nuclear materials. These high-technology, dual-use items are currently included on the Commodity Control List (which incorporates the Nuclear Referral List), and official approval is required for export. While controlling the export of items that have a direct or sole mil-

[2]Japanese and West European perspectives on export controls on trade with the Soviet bloc are analyzed in Technology *and East-West Trade* (Washington, D. C.: U.S. Congress, Office of Technology Assessment, OTA-ISC-1O1, November 1979) and *Technology and East- West Trade: An Update* (Washington, D. C.: U.S. Congress, Office of Technology Assessment, OTA-ISC-209, May 1983).

[3]Gary Clyde Hufbauer and Jeffrey Schott, *Economic Sanctions in Support of Foreign Policy Goals* (Washington, D.C.: Institute for International Economics, 1983), p. 8.

[4]Effective Mar. 12, 1982, controls were expanded on trade with Libya beyond those included under antiterrorist controls. Libya was placed in Commodity Group S. See U.S. Department of Commerce, International Trade Adminstration, *Export Administration Annual Report FY 1982* (Washington, D.C.: U.S. Government Printing Office, 1983), p. 31.

itary use poses no serious controversy, there is much disagreement about inclusion of dual-use items. Experts disagree about how important such dual-use items are to military development and whether denial will seriously disadvantage the Soviet Union. One proposal under consideration in Congress would prohibit the sale of dual-use items to any nation not a signatory to the Nonproliferation Treaty (NPT). Only a small percentage of dual-use license applications (about 6 percent) have been granted for exports to Islamic countries in the Middle East.[5] It is unlikely that institution of such restrictions on dual-use items would result in denial of access to recipients, since in most instances other supplier nations are in a position to sell them, but the institution of such controls could be expected to reduce U.S. exports to some Middle Eastern countries.

Some wish to extend national security controls to non-Communist nations because U.S. technology can flow through third countries to the Soviet Union, Proposals to strengthen the controls on transfer of many items to all nations worldwide acknowledge the potential threat to the United States of technology diffusion through third countries. However, such proposals would require a considerable expansion of government efforts, and the burden of more stringent controls on licensing would fall heavily on multinational corporations. It should be noted, however, that there is strong support for the national security controls currently operating. For example, there has been little debate about whether they are appropriate in discussions of renewal of the Export Administration Act; disagreement has arisen primarily about how such controls could be perfected or extended.

licenses for export of dual-use items in recent years have been granted for exports to Israel, a nation not a signatory to the NPT. Saudi Arabia, also a nonsignatory, has made significant purchases, as well. See General Accounting Office, *Controlling Exports of Dual Use Nuclear Related Equipment*, Sept. 29, 1983, p. 8.

Nonproliferation Controls

With respect to nonproliferation controls, the United States is not a major supplier of nuclear equipment to Islamic countries in the Middle East. Proposals to extend controls to dual-use items, as discussed above. could specifically affect dual-use exports to those nations not signatories to the NPT, such as Algeria, Israel, and Saudi Arabia. In addition, decisions concerning supply of spare parts and nuclear technologies to nations, such as India, (which in the years ahead may become new suppliers to Middle East countries) may also be relevant over the long term. Debates continue between those who argue that the United States must carry on a dialog with such nations (and supply nonsensitive equipment to them) and opponents who question the wisdom of providing any type of assistance to nations that have not accepted full-scope safeguards and may become new suppliers of nuclear technology in the years ahead.

Chapter 9 identified specific measures that could strengthen incentives for reducing the spread of nuclear weapons in the Middle East. Most of these measures would depend on cooperation with other supplier nations. These include agreements among suppliers to limit exports of highly enriched uranium and laboratory- scale sensitive facilities, and strengthening of safeguards. including measures such as improved remote-sensing monitoring devices.

In addition, the United States could unilaterally adopt some measures that could affect nuclear weapons proliferation in the region. The major controversy is between those who oppose any type of nuclear cooperation with nations in the region, and those who argue that the United States can best influence recipient countries by assisting them in peaceful nuclear programs. Those in the first group favor hindering **by any** means available the growth of nuclear knowledge and infrastructure, even when the relationship to a weapons program is indirect or remote. They therefore

support the use of strong measures, including prohibitions against Export-Import Bank financing of nuclear exports, restrictions on foreign students studying in the United States, and withdrawal of support for organizations such as the International Atomic Energy Agency over issues of political principle, such as the refusal to accept Israel's credentials. In contrast, those who favor providing assistance see it as a powerful way to achieve nonproliferation goals. The bilateral nuclear cooperation treaty with Egypt is, in their view, a major accomplishment in that strict nonproliferation provisions are included in exchange for assistance from the United States.

OTA's research suggests the merit of an approach based on the assumption that the United States must deal realistically with the fact that many developing nations see commercial nuclear power as an important part of their development plans. Both proponents and opponents of expanded restrictions on nuclear exports would view increased efforts to assist developing countries in alternative energy development, including solar energy, as acceptable. Rigid policies relying exclusively on denial of all nuclear technologies can be expected to reduce U.S. influence on the nuclear programs of Middle Eastern nations.

Foreign Policy Controls

In contrast to the situation with respect to existing nonproliferation and national security controls, where there is general support for the controls themselves and where disagreements focus on whereto draw the line between military and civilian items, there is considerable disagreement as to whether foreign policy controls are at all effective. These types of controls have been used to restrict exports of aircraft of various types to nations supporting terrorist activities, including Syria, Libya, the People's Democratic Republic of Yemen, Iran, and Iraq.[6] In addition, controls on trade with Iran were used during the hostage crisis. Unlike the other types of controls discussed above, foreign policy controls have been applied selectively to Islamic countries in the Middle East.

Proponents of these controls view them as, at a minimum, important for their symbolic value in clarifying the opposition of the United States to regimes supporting terrorist activities. However, the actual effect of these controls in injuring or pressuring the target is often limited because other supplier nations can step into the breach and because the target countries are, in most cases, not friendly with the United States and may therefore prefer to trade with other nations. Foreign policy controls can be effective when other OECD nations also restrict exports or support U.S. policies in other ways. Some observers believe that this was the case with foreign policy controls instituted against Iran during the hostage crisis.[7] Opinions differ about the effects of controls used against Libya.

Because the President has considerable discretion in instituting these controls, controversy inevitably surrounds their usage. In no case has the application of such controls alone led to the clear achievement of objectives such as termination of terrorist activities. While the precise effects cannot be measured, such controls certainly put a chill on U.S. trade relations with the targeted countries and may increase doubts about the reliability of the United States as a supplier. Given the availability of aircraft from other suppliers and the other problems mentioned above, it appears unlikely that foreign policy controls can be expected to restrict access severely to advanced civilian equipment, and it is doubtful that such controls will substantially modify the behavior of nations to which the sanctions are applied. Nevertheless, these controls do limit involvement by U.S. firms in certain nations, and they have been viewed as one of the few available ways that the United States can publicly im-

[6] Foreign policy controls against Iraq are no longer in effect. On Jan. 23, 1984, Iran was added to the list of nations included to Section 6(i) of the Export Administration Act of 1979– Iran," *Federal* Register, vol. 49, No. 15, Jan. 23, 1983, p. 2836.

[7] A recent analysis by Hufbauer and Schott, cited earlier, concluded that the sanctions imposed against Iran during the hostage crisis were comparatively successful, while the result was doubtful in the case of sanctions used against Libya.

pose sanctions on nations for supporting terrorism.

Antiboycott and Other Policies Regulating U.S. Business Overseas

As with foreign policy controls, it is impossible to assess the precise trade effects of other types of regulations affecting U.S. business operations in the Middle East, such as antiboycott regulations and the Foreign Corrupt Practices Act. Both of these policies have been strongly criticized by the business community as unique U.S. policies that disadvantage U.S. firms vis-a-vis their competitors. Because it has been implemented solely in the Arab boycott of Israel, the antiboycott policy has been opposed by businessmen and others who see it as reducing U.S. commercial interactions with Islamic countries. In addition, opponents criticize U.S. opposition to the boycott as inconsistent with U.S. export controls that aim to use trade as a lever. The proponents, in contrast, say that antiboycott policies preserve U.S. commitment to the principle that controls should not be extended to third parties. They also maintain that the actual commercial losses from the boycott are minimal, noting that Arab nations often waive boycott regulations when they have special need for a particular kind of equipment or technology.

OTA's research suggests that efforts to extend controls can best be focused on improving nuclear nonproliferation controls and those covering military exports. Expanding other types of controls, such as foreign policy controls which apply solely to Middle East countries (either to cover more nations or to include additional items), would certainly heighten the political dimension of technology trade, and it is not clear that they would prove effective in meeting goals such as reducing terrorism. Placing primary emphasis on nonproliferation and national security controls could increase the predictability and maximize the effectiveness of controls. Only under unusual circumstances, such as the Iranian hostage crisis, when the positions of other Western supplier nations were strongly unified and supportive, has there been evidence that controls on civilian trade have contributed to achievement of the desired foreign policy goal. Even in that case, however, other types of measures were employed, and the exact contribution of foreign policy controls is not clears

THE ROLE OF TECHNOLOGY TRANSFER IN FOREIGN AID

Two Middle East nations, Egypt and Israel, are the largest recipients of U.S. economic assistance of any nations worldwide. The importance of U.S. Government-supported assistance programs, including those designed to promote technology transfer, will probably increase if economic growth proceeds at a slower pace than was the case in the the 1970's in the Middle East. Not only the lower-income nations, but the middle- and higher-income Middle East nations as well, seek to promote technology absorption in order to build indigenous capabilities. At the most general level, the major points of disagreement concerning development assistance pertain to allocation of scarce resources and the potential for political backlash.

Economic Assistance and Political Influence

There is no agreement concerning the relationship between economic assistance and U.S. political influence. Some worry that U.S. assistance programs may not always win friends, but may lead to resentment by recipients. On the other hand, many others argue that economic assistance is a critical element of U.S. foreign policy in the Middle East. More specifically, the express desire of many Middle Eastern nations to acquire Western technology indicates that economic assistance involving technology transfer can be a particularly important aspect of U.S. foreign policies.

OTA's research confirms that effective development assistance programs can assist the United States in winning friends and counter-

[6]Other policy instruments, such as quasi-military actions taken in an attempt to rescue the hostages, were used in conjunction with the trade sanctions.

ing Soviet bloc presence. At the same time, however, it is important to temper expectations of political gain with a recognition that political backlash can also result. Recipients sometimes resent the advice given by foreign aid officials whose job it is to see that funds are spent effectively. In addition, if programs grow rapidly, recipients may find themselves facing economic problems associated with heavy reliance on foreign subsidies. Despite these problems, because nations of the region generally view Western technology as superior to that of the Soviet bloc, technology transfers from the United States are clearly important elements in the development strategies of these countries.

Technology Transfer v. Other Goals of Economic Assistance

A case can be made that development assistance programs emphasizing technology transfer contribute more effectively than other types of economic assistance to the long-term economic well-being of the recipient nations. In contrast to simply giving away food or commodities, programs involving technology transfer may have longer term effects because they assist recipients in developing their own capabilities. Such programs have the potential for fostering the development of lasting human relationships between individuals in recipient and supplier countries.

On the other hand, programs involving technology transfer require the expenditure of considerable resources—financial and organizational. It is too much to expect that all aid programs be directed at promoting technology transfer in a country like Egypt, where aid officials are pressed to expend the funds allotted. If the goal is to promote more extensive technology absorption, doubling the aid budget alone would not necessarily achieve desired results. Small-scale, focused programs, moreover, may contribute significantly to technology transfer in key sectors. While some argue that recipient countries should be given more flexibility in the use of aid funds, programs involving technology transfer require extensive coordination between individuals from recipient and supplier countries. Continuing involvement by the donor is a prerequisite for such programs, but such involvement in the host country may lead to the types of resentment mentioned above when programs grow so rapidly that they cannot be effectively managed.

ECONOMIC ASSISTANCE AND COMMERCIAL PROMOTION

Economic assistance programs clearly provide export opportunities for firms of supplier countries. Other supplier countries, such as Japan and West European countries, acknowledge and attempt to capitalize on this linkage more than the United States has. Nevertheless, in practice, U.S. economic assistance has also provided export opportunities involving equipment and technical services for U.S. firms. Indeed, procurement regulations ensure that U.S. firms are the major suppliers, sometimes despite the fact that other suppliers can provide lower cost goods.

At the crux of disagreements is the fear on the part of some that aid goals would be distorted by a more conscious linkage of aid to commercial promotion. U.S. assistance policies have, in recent years, emphasized helping the poorest nations meet basic human needs, aims which are primarily humanitarian. Those who support this general thrust worry that more extensive involvement of U.S. business, in programs such as private sector initiatives, may skew assistance to those projects most in the interest of U.S. business, and not necessarily to those most likely to benefit the average citizen in the Middle East. On the other hand, many note that in practice, particularly in procurement regulations, U.S. aid benefits U.S. business. Since many other suppliers are willing to combine aid with commerce in mixed credits and other areas, such as bilateral technical assistance agreements, they say that the United States ought to do likewise. OTA's research indicates that more explicit recognition of the links between commerce and assistance could at least contribute to a better understanding of the interrelationship. Because the

technology transfers most important for the user industrial and service firms are normally provided by private sector U.S. firms, policies designed to enhance the participation of U.S. private sector (including nonprofit) organizations could be particularly important.

A related area of dispute concerns the question of whether U.S. aid should be directed solely to the poorest countries, or whether middle- and even upper-income developing countries are appropriate recipients. In recent years, the view that assistance should be concentrated in those nations in greatest need has been prominent. Some, who view philanthropic goals as primary, question the appropriateness of aid to richer countries as incorrect not only in view of budgetary constraints, but also on the grounds that commercial interests may take precedence. Others observe that, particularly in the Middle East, many nations enjoying comparatively high levels of gross national product per capita nevertheless need technical assistance to expand their productive manufacturing facilities. Such assistance can be and is, of course, purchased from private U.S. firms. Other West European supplier governments have in some cases promoted technical assistance programs in the oil-rich as well as the lower-income nations of the region.

OTA's research suggests the merit of programs promoting technology transfers in industry and services in addition to those that already exist in areas such as health care and agriculture. Programs focusing on the needs of the end-users of technology in manufacturing and service systems are especially critical. In particular, assistance in technology selection and the setting of performance standards, specialized technical manpower training programs, programs designed to improve maintenance and servicing of facilities, and efforts designed to adapt technology to local requirements are needed in countries throughout the region. Those programs responding to the concrete needs of the organizations and firms that carry out the production processes stand the best chance of providing tangible gains and of leading to self-sustaining activities. Such efforts are essential for all middle- and upper-income Middle Eastern countries, as well as for those not rich in oil.

THE COSTS AND BENEFITS OF COMMERCIAL PROMOTION POLICIES

The benefits of commercial promotion policies are primarily economic and accrue most directly to the exporting firms, while the costs are sometimes calculated in political as well as economic terms. The major disadvantages of commercial promotional policies are that in some cases they may run counter to foreign policy goals, and they involve costs to the U.S. taxpayer. Those who oppose policies promoting technology trade with Middle Eastern countries may do so for a number of reasons. Depending on the type of export involved, they may judge that acquisition could contribute to the military power of an adversary or potential adversary. In addition, some worry that the involvement of U.S. firms overseas may lead to movement of production offshore so as to disadvantage U.S. labor. Others wish to reduce U.S. interactions with nations whose foreign policy positions do not conform to their definition of U.S. interests. In addition, some have also opposed promotional policies on the grounds that the U.S. taxpayer should not be asked to bear the costs of programs seen as benefiting only a few firms.

Generally, supporters of promotional policies see commercial interactions as the foundation for peaceful relations between countries. They see the expansion of U.S. export controls during the past decade as setting a uniquely negative context for technology trade, which may lend U.S. firms a reputation as unreliable suppliers. Supporters of promotional policies note the more extensive policies of other supplier countries and argue that the U.S. Government should do more to support U.S. exports so that U.S. firms can remain competitive. In their view, the movement of production offshore cannot be stopped, since it occurs in conjunction with technological change and shifts in comparative advantage. Finally, proponents see Government support

for exports as beneficial not only to the specific exporting firms, but also to the U.S. economy more generally. In their view, the United States can only maintain a technological lead by continuing to innovate and compete successfully in world markets through both sales of products and technology.

As discussed in detail in chapter 13, it is not always easy to identify U.S. economic interests, nor is it possible to equate them with the interest of particular firms. Large U.S. firms have been prominent as project managers and providers of technical services. While many smaller firms are involved as subcontractors and their exports improve the overall national balance of payments, large firms generally have been most willing and able to take on the risk incurred when a firm commits itself to the ongoing process of technology transfer in a developing country. In addition, large Middle Eastern projects are normally multinational, involving U.S. firms along with those from many nations. This trend of growing tie-ins with foreign competitors is apparent in many research-intensive industries worldwide and certainly not unique to business operations in the Middle East. The real question, however, is when and how the U.S. Government should promote commercial technology trade and transfer. This dilemma is particularly apparent when two or more U.S. firms compete for contract awards because commercial officers are expected to maintain neutrality in their representation efforts.

Debates over export subsidies illustrate disagreement concerning not only who benefits and who loses from promotional policies, but also tradeoffs between short-term gains arising from mercantilist policies versus long-term benefits of a free trading system. OTA's research confirms the widely held view that many Western supplier countries have developed more extensive commercial promotion policies than those of the United States. Because the United States has been historically committed to pursuit of an open international trading system, many are reluctant to adopt an approach that would require emulation of the extensive subsidies offered by foreign supplier governments. On the other hand, a growing number of observers have suggested a variety of measures that would provide the U.S. Government with expanded capability to offer export credits. In their view, the U.S. Government should not stand by while other supplier nations provide more extensive supports for their firms.

Debates concerning subsidies are sometimes carried out in extreme terms: whether to emulate foreign supplier programs or to withdraw. Put in other terms, there is a perceived tradeoff between the goals of expanding U.S. exports and the adverse consequences on all countries of increasing protectionism. Despite the apparent tension between these goals, a number of less dramatic measures could be employed without jeopardizing multilaterally agreed-upon trade rules. The lending authority of the Export-Import Bank could be expanded to match foreign subsidies within the limits internationally agreed on by the OECD and the GATT (General Agreement on Tariffs and Trade). Similarly, the United States could continue to work to expand international agreements covering domestic subsidies and trade in services and to identify cases of unfair subsidies offered abroad in order to call them to international attention.

OTA's research indicates that improvements in routine business representation overseas, coupled with measures to improve the capability of the U.S. Government to collect and analyze information about foreign trade and investment, are additional concrete steps that would assist exporters. Thus, there are a number of alternatives open to policymakers short of emulation of the more aggressive financing policies of other supplier nations. OTA's work suggests that such moderate measures that do not constitute aggressive mercantilism would be significant in supporting U.S. business overseas. They are, however, unlikely to change the competitive positions of U.S. firms in Middle Eastern markets quickly or dramatically.

THE PROMOTION OF TECHNOLOGY TRANSFER THROUGH COMMERCIAL POLICIES

Few commercial policies have been designed with the express purpose of promoting technology transfers. One reason is the concern that technology transfers promote the development overseas of industries that will compete with U.S. firms and lead to loss of jobs in the United States. In contrast to export premotion, programs supporting technology transfer imply a longer term involvement of U.S. firms. Some see this involvement primarily as commercially beneficial, while others worry about investment risk.

The one U.S. agency which assists potential investors by providing insurance and other services is the Overseas Private Investment Corporation (OPIC). OPIC in its reviews of applications for insurance considers the extent to which commercial investments in developing nations will result in technology transfers. Congress has also required OPIC to take into account the employment and trade effects on the United States of potential projects. OPIC-supported projects reflect consideration of a variety of U.S. policy goals. U.S. investors are rightly cautious about investing in foreign nations; OPIC insurance guarantees could be enlarged if policy makers decided to promote technology transfers. In that situation, a number of other options could be considered. For example, firms exporting technical services could be assisted in other ways: U.S. economic assistance funding could be provided to support the technical training component of certain projects viewed as particularly worthy, or special tax treatment could be provided to firms exporting technical services required for technology transfer to developing countries.

Photo credit U S Overseas Private Investment Corp

U.S. engineers worked with Saudi project managers in planning and scheduling construction at King Faisal Hospital in Saudi Arabia. The project was supported by OPIC

In addition, bilateral trade and investment treaties could be considered.

OTA's research showed that, among the technology transfer sectors examined, only technology transfer in petrochemicals will contribute to the growth of a Middle Eastern export industry, By far, the great majority of technology transfers to date stimulate the growth of industries and services producing for local Middle Eastern markets. Over the long term, however, Middle Eastern countries will produce more goods and services for export, and technology transfers will contribute to the growth of this export capability.

In the last analysis, however, decisions taken by U.S. firms themselves more importantly influence their export success than do Government policies. Nevertheless, commercial promotional policies can provide a supportive climate for exports and technology transfers.

POLICY PERSPECTIVES

Considering the tradeoffs discussed above, it is not surprising that a coherent technology transfer policy has not been established. In particular, the tension between political and economic interests has been a pervasive theme. Actions have been taken simultaneously to achieve differing policy goals. New measures could be introduced to further any one of

Photo credit: Saudi Arabian Ministry of Commerce

Desert scene

three general goals (commercial promotion, development assistance. safeguarding U.S. security), but it is unlikely that such measures would alter dramatically the volume or nature of U.S. technology trade with the region, Without an overarching consensus reconciling political and economic interests, the effects would remain inconsistent.

Policy makers may wish to alter substantially the scope and nature of commercial technology transfers to the Middle East by developing a more consistent perspective on technology trade and transfer to the region. 1 n order to do so, a new understanding of the role of technology transfer in (J. S. foreign policy would have to be established and widely accepted. Three general perspectives are outlined below. In each case, specific policy measures of various types (development assistance, export controls, and commercial promotion) could be selected.

PERSPECTIVE 1: SELECTIVE USE OF TECHNOLOGY TO PROMOTE POLITICAL INTERESTS

The crux of this strategy is to provide friends and deny enemies access to U.S. technology. This policy perspective would make technology trade the servant of U.S. foreign policy toward the Middle East. The U.S. Government would extend and use controls selectively to impose sanctions on nations whose

policies run counter to those of the United States. All of the controls mentioned earlier could be used to deny access to U.S. technology to unfriendly nations, but technology could be used systematically as an incentive as well as a deterrent.

As a complement to the policy of denial, the Government could reward certain nations by providing them with advanced technologies. Exceptions to overall export policies could be used to single out friendly nations for special treatment. Sales of dual-use technologies, in particular, would be promoted officially by the Government. Development assistance programs could be a major vehicle for providing rewards, with programs involving technology transfer receiving special emphasis. Commercial promotional programs involving U.S. businesses would be strongly tied to foreign policy goals. Thus, whether used as stick or carrot, civilian technology would be employed for furthering U.S. foreign policy goals.

This option has the advantage of placing major emphasis on U.S. foreign policy interests that are of central importance to policymakers. The attraction of this policy option is that it capitalizes on technology as a potentially effective instrument for influencing the behavior of key actors in the region. Furthermore, in cases where other policy measures are unavailable or inappropriate, this option would allow for systematic use of denial. On a more positive note, the provision of advanced technologies to nations closely associated with U.S. foreign policy positions could significantly enhance their regional and global stature.

Such a policy option has some drawbacks, however. The success of this option depends on accurate forecasts of foreign policy orientations of Middle Eastern countries. Because political alignments shift with regime changes and developments in the region, one danger would be sudden interruptions of technology transfers due to political shifts, probably requiring U.S. Government compensation to firms involved. This approach would place considerable burdens on the U.S. Government to oversee commercial technology trade and might result in buyers simply turning to other suppliers. OTA's analysis of impacts of technology transfers indicates the severe difficulties in anticipating in advance the effects, particularly political and social effects, of technology transfers. This policy option could also be impeded by disagreement within the Government or the larger society about the appropriate U.S. policies toward specific nations. It would certainly politicize even more strongly U.S. technology trade and would run the risk of jeopardizing relations with nations not closely associated with U.S. positions, yet not closely allied with unfriendly countries.

PERSPECTIVE 2: DECOUPLE COMMERCIAL TECHNOLOGY TRADE FROM POLITICAL INTERESTS

Policy makers may wish to reduce the linkage between politics and economics which has distinguished policies of the United States from those of other supplier nations. This option is based on the assumption that technology trade with all nations, regardless of their political relations with the United States, should be vigorously promoted. U.S. political and diplomatic strategies could proceed independently, while trade in nonmilitary items would be permitted with any nation in the region where U.S. firms judged the market opportunity worth the risk of investment or involvement. This would require elimination of controls for nonmilitary exports designed specifically to influence exports to the region (foreign policy controls and the antiboycott program). Under such an approach, U.S. policies would more closely resemble those of other suppliers, specifically Japan and Western European countries.

The advantage of such a policy option would be to expand commercial opportunities and to eliminate the tension that has existed between commercial and military/political issues. A major attraction of this perspective is that it would put U.S. firms on a more equal footing with their Japanese and West European competitors, and possibly lead to the expansion

of U.S. exports to Middle Eastern countries that are not currently major trading partners. In addition, it would place fewer demands on Government officials to oversee technology trade and provide opportunities for establishing a presence in nations not currently allied with the United States.

Such a policy option would limit the policy instruments available to the U.S. Government, however, because the presumption would be that technology trade would not be used as a lever. In addition, because U.S. firms would be expected to increase exports to nations not closely associated with U.S. policy positions, the probability would increase that the U.S. Government might be required to protect American citizens abroad or assist firms exposed by political changes.

On the other hand, such a policy would probably not be adequate to quickly or completely eliminate the selective pattern of technology trade. OTA's research indicates that technology trade has in the past been strongly influenced by U.S. foreign policies: even if the disincentives for nonselective trade were terminated and more vigorous promotional policies were put in place, U.S. firms would probably still continue to prefer sales to friendly nations where the risks of investment are perceived to be lower than in other countries. Conversely, sales would be difficult in countries where there is strong hostility to the United States. Furthermore, assuming that economic assistance policies remained strongly tied to larger foreign policies, incentives for selective technology trade would remain. In order to expand trade, this approach could be widened to include vigorous promotional policies. On the other hand, simply eliminating some political controls on trade would undoubtedly encourage wider trading relationships over time.

PERSPECTIVE 3: **PROMOTE CIVILIAN TECHNOLOGY TRANSFER**

Neither the technology leverage nor the decoupling perspectives are specifically oriented toward policies affecting technology transfer. In both cases, the effects on technology trade, particularly exports of products, would be more noticeable than effects on technology transfer per se. Policymakers may wish to facilitate expanded technology transfers from the United States, and more extensive technology absorption by recipients, through establishing a clear and explicit policy. This approach is based on the assumption that civilian technology transfers have been generally mutually beneficial and that the Government should do more to encourage them. Many observers see this as a "natural" policy, since the United States excels in technology development, and technology absorption is a key component of economic development. Underlying this perspective is a conviction that it is misguided to try to control access to U.S. civilian technology and a recognition that the United States can best maintain its strength in technology development by participating actively in international technology exchange. This approach could include the retention of national security and nonproliferation controls, and it could leave open the option of employing trade controls under extraordinary circumstances, such as the Iranian hostage crisis. However, the major thrust would be to facilitate expanded transfers of civilian technologies. Product and equipment exports could be expected to increase somewhat, but technology transfer would be the centerpiece.

As indicated earlier, policy measures designed to foster commerce and development assistance could be used to promote technology transfer. These might include increasing the numbers of development assistance programs aimed to transfer technology in manufacturing and service industries; providing incentives to private sector organizations (including nonprofit organizations) to participate in such projects; expanding technical assistance to middle- and upper-income nations; increasing Government financing and insuring of projects involving technology transfer (through programs of the Overseas Private Investment Corporation and the Export-Import Bank); upgrading the technical capabilities of commercial and aid representatives overseas; and expanding bilateral technical assistance agreements in specialized fields.

OTA's research indicates that the Federal Government has only very limited capabilities to assess trends in international technology transfer. A significant step forward would be to improve data collection for trade in technical services. In addition, the Federal Government could play a stronger role, in cooperation with private sector groups, in improving the flow of information between recipients in developing countries and U.S. firms and organizations.

Given the varied human, capital, and natural resources of Middle Eastern countries, technology transfer has important regional significance. The training of technical personnel in one Middle Eastern country, for example, may benefit other countries–through the migration of labor or through the training of foreign nationals. Some types of Government-supported training programs and technical assistance efforts could include representatives from a number of recipient (and perhaps supplier) countries. In addition, programs could be carried out in conjunction with regional organizations. The education of Middle Eastern students in technical and scientific fields in the United States is an important channel for technology development and transfer. Programs directed toward professional enrichment and retraining at midcareer could also be introduced. Finally, international agreements promoting fairness in service trade, in use of mixed credits or adjustments to the anticipated growth of Middle Eastern exports, could be pursued.

This approach implies considerable resource allocation by the Government to new and expanded programs, and some coordination of the efforts of various agencies. One problem would inevitably be to introduce overall consistency or direction in these varied programs. Another type of challenge would be in designing programs that effectively promote technology transfer and in evaluating their success. In addition, because technology transfers involve longer term interactions with recipients than required for exports, and because the approach involves a balancing of political and economic interests, serious disagreements could arise about when "extraordinary circumstances" justify use of trade controls. Furthermore, regional conflict or local political instability present obstacles to the implementation of perspective 3 to an even greater extent than would be the case for perspective 2.

The approach could capitalize on technology transfer as an important commercial and political asset, possibly opening relations with nonaligned countries. Assuming that a consensus in favor of civilian technology transfer to developing nations were established, such programs could enhance the influence and prestige of the United States in the Middle East and contribute to regionwide development.

CONCLUSION

Each of the three policy perspectives outlined above centers around a consistent strategy emphasizing political and economic interests to different degrees and in different ways. Because of the persisting tradeoffs between objectives (particularly the tension between political and economic interests), there are formidable obstacles to the formulation of a comprehensive policy and a consistent strategy. Although each perspective may have its virtues in the abstract, a new consensus on overall foreign policy direction would be necessary to implement any one of them fully.

Even if no consistent policy were established, U.S. policymakers will continue to face a fundamental choice as they deal with these issues on a case-by-case basis: they can encourage or discourage commercial technology transfers through the choices they make. OTA's research indicates that commercial technology transfers to the Islamic Middle East have been generally beneficial economically and that all the nations in the region place high priority on technology trade and transfer in their development planning. Therefore, U.S. policies-regardless of which goals are maximized-will remain important to nations in the region.

In the decade ahead, the Middle East will remain an important market for equipment

and technical services as well as a region of great strategic importance to the United States. Instead of subordinating politics to economics, the challenge is to balance these interests in a more consistent way. The question is whether U.S. policies can be designed to enhance the mutually beneficial aspects of commercial technology transfer without jeopardizing political interests. Without a more consistent policy, the pattern of expanding controls and selective technology trade characteristic of years past will probably persist.

OTA's research indicates, at a minimum, the need to consider the implications of other policies on patterns of technology transfer. More generally, technology transfer from the United States to the Middle East can be viewed as a major component of U.S. influence in the region. Although unanticipated negative effects have occurred, civilian technology transfers have in practice supported mutually beneficial relations with countries of great strategic and economic importance to the West.