

# **PART E**

## **U.S.-International Transportation**

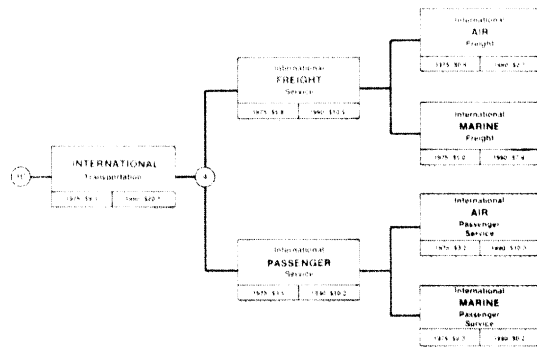
## INTRODUCTION

U.S.-international transportation can be categorized in many ways. The tree shown in figure E.1 outlines one such division.

International transportation does not receive the same depth of treatment as domestic transportation for two reasons:

- First, in the United States, international transportation does not represent the major proportion of the national economy that it does in other countries.
- Second, international passenger transportation requirements usually do not differ significantly from domestic transportation requirements. For example, facilities at major airports need not be modified in major ways because aircraft depart for international rather than local destinations. Highly specialized facilities are used, of course, for particular commodities in the oceangoing trade.

National defense, balance of trade, and other international policy concerns are frequently major considerations in international transportation. In these discussions, purely transportation factors are frequently secondary.



NOTE: The amounts shown are the transportation bills for 1975 and 1990 in billions of 1975 dollars.

Figure E.1. Transportation Tree.

## GROWTH TRENDS

Directly significant to transportation concerns are the trends in growth in U.S. international travel. Prospective differences between the rates of growth in international air and freight flows compared to domestic patterns could affect U.S. facilities planning in certain areas—the most significant being the development of new international air gateways, and new deep-water port and transfer facilities.

## POLICY CONCERNS

In the international transportation sector, the U.S. Government must consider national security interests and its relations with foreign governments, as well as the concerns of equity and economic efficiency which impel much of its domestic transportation policies.

## HIGH-PRIORITY CONCERNS

**Energy conservation.** The construction and utilization of energy-carrying transportation capacity for both imports and exports is a high-priority concern. Specific aspects of this involve the production and utilization of hopper cars as related to the domestic rail system and rail capital needs; port development, particularly deepwater ports for petroleum imports; and the U.S.-flag tanker situation vis-a-vis shipyard and operator well-being, as well as the availability and utilization of crude oil and petroleum products. Thus this heading is related to the attainment of an *adequate energy transportation infrastructure* as part of the even broader development of an *improved planning capability*.

**Promotion of regulatory reform.** The Department of Transportation is concerned both with the reduction of delays in the regulatory process, and the structuring of regulation to provide adequate information and controls to ensure the maximum advantages from healthy competition. The special circumstances facing international air and water carriers will be mentioned in the final sections of this discussion. The smooth, efficient flow of people and goods across international boundaries can be affected by what is done for the domestic carriers that support (or impede) access to and from international carrier service points. Thus this topic is also related to activities flowing from the *Statement of National Transportation Policy* with reference to *improving rural transportation, correction of Federal subsidy inequities, productivity increases, improved safety*, and the integration of consumer views into *improved planning capability* as well.

**Productivity.** The extent to which the domestic and international segments of the U.S. transportation system use technology efficiently will have an important impact on the level of U.S. exports and imports. For example,

the agreement by which some containers would be packed twice ("restuffed") on their way overseas protected longshore labor interests in the port areas involved but raised the cost of these items and lowered their attractiveness on world markets.

Since international transportation is by its very nature intermodal, there is an obvious need for greater intermodal planning affecting both the U.S. and foreign ends of international movements. Thus, the Federal Government has some responsibility for overseeing international transportation and negotiating to remove international impediments; however, the achievement of improved productivity will continue to lie largely with the private sector.

## **OTHER CONCERNS**

***Improved service.*** This topic includes reducing unnecessary impediments to the free flow of travelers and commodities between nations through both domestic actions and positions taken in international forums with respect to modernization of rules and procedures and the increased acceptance of standardized data and systems.

***Environmental protection.*** Efficient improvement of the environment through reduction of such pollutants as aircraft noise and maritime water pollution is a topic in which the Department of Transportation and the Government maintain a continuing concern and conduct research, both in the United States and with cooperating foreign institutions.



# CHAPTER XIV

## International Aviation

### PASSENGER TRAVEL

International travel by air exceeded passenger travel by sea for the first time in 1958. By 1975, international air travel had effectively replaced sea travel completely as the mode of international passenger movement.

All phases of air travel have grown dramatically, although international movement of goods is still predominantly by surface modes. Total international air travel growth rates have paralleled those in domestic air travel, both growing much more rapidly than intercity travel as a whole. Lesser but still substantial growth rates are expected to apply through 1990. Figure XIV.1 charts these trends, with 1950 as the index year.

### REGIONAL GROWTH PATTERNS

The largest regional air passenger markets—the U.S. domestic, the North Atlantic, and the intra-Europe—connect the mature economies

of the world. These markets will continue to grow over the coming decade, and will continue to account for a major share of world air passenger travel by 1985. However, it is the developing areas of Asia/Oceania and Latin America that will show the greatest gains in air travel over that period. By 1985, these routes will approach the intra-Europe and North Atlantic markets in size. (See figs. XIV.2 and XIV.3.)

Within the growth to date, there are several significant trends. The first of these concerns the share of U.S.-international travel carried by U.S. air carriers. In the early 1960's, the number of passengers carried on U.S. air and foreign carriers was almost equal. U.S. carrier growth later exceeded that of foreign-flag carriers, with a 55-45 split in favor of U.S. carriers in the early 1970's, before becoming approximately equal again in 1975 (see fig. XIV.4).

A major cause of the recent decline in the U.S. air carrier share of U.S.-international air travel is the sharp decline in the U.S. share of travel in the North Atlantic market, which dominates the world air travel market.

In this crucial market, the historical pattern has been one in which U.S. citizens have constituted about 60 percent of all travelers. They have given only slight preference to flying U.S.-flag carriers, while non-U.S. citizens have used their own national airlines by wide margins. (Fig. XIV.5 illustrates the historical trend in this market.) Recently, a decline in U.S. travelers, plus a shift in their preference to foreign-flag carriers, has caused the U.S. carrier share of North Atlantic travel to drop even more. U.S. programs to instill a "fly American" spirit in U.S. citizens traveling abroad and to do a more effective job of attracting noncitizens to U.S.-flag carriers have been instituted to seek to redress the imbalance.

The other major trend affecting both the travel habits of potential passengers and airline income is the considerable growth in discounted scheduled and charter services. Figure XIV.6 illustrates the considerable growth in seats available on charter flights provided by U.S. and foreign, scheduled and supplemental

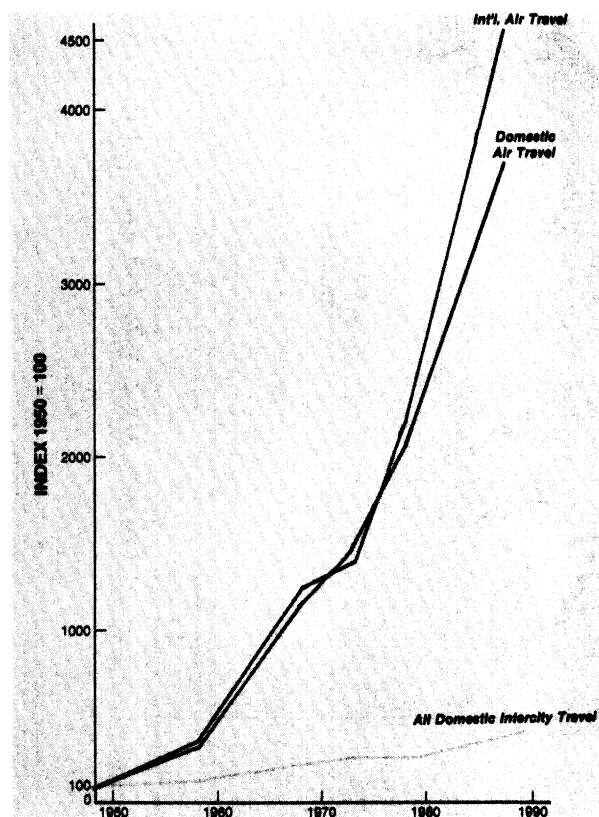
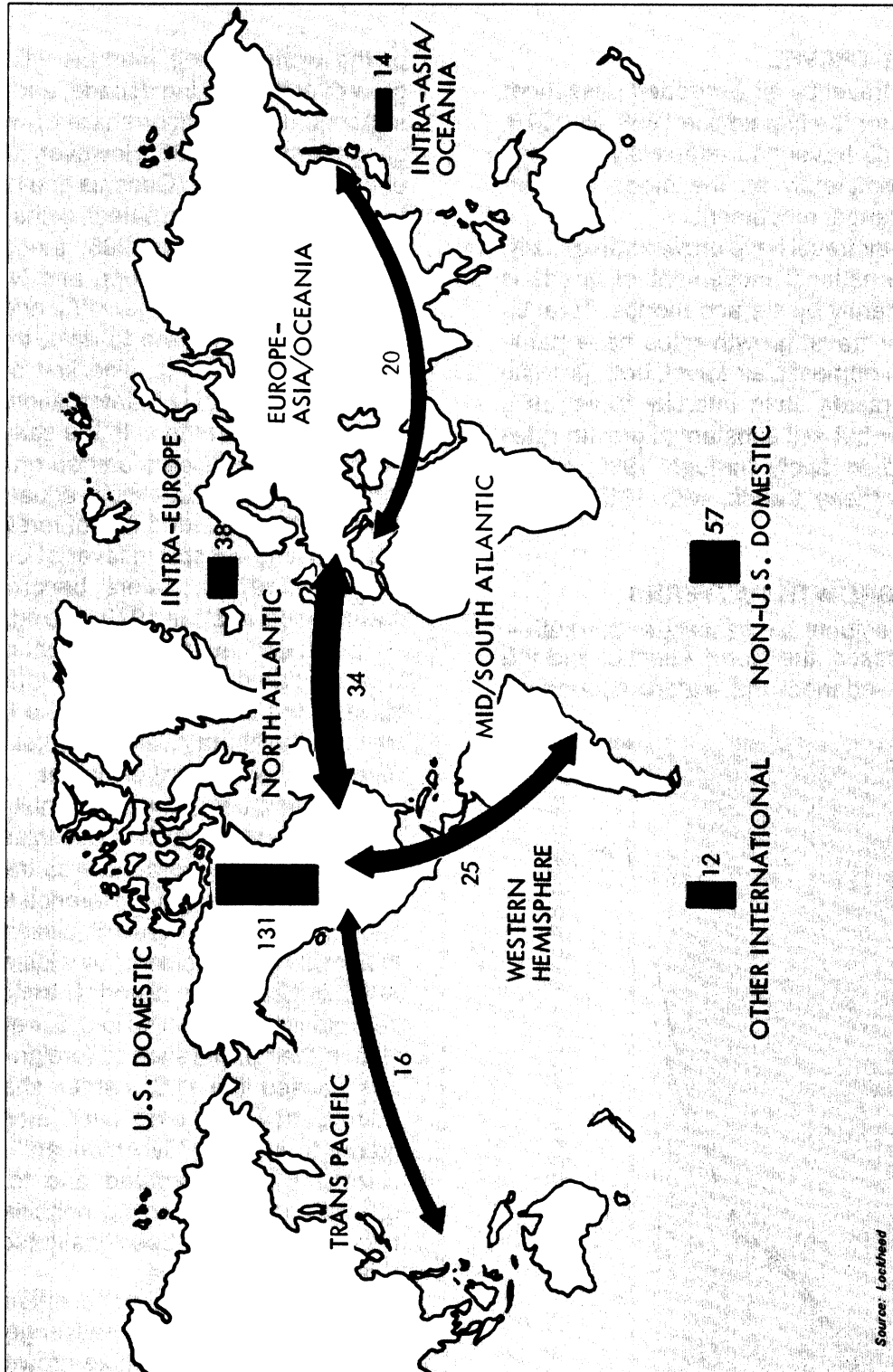


Figure XIV.1. Growth in Air Passenger Travel.



Source: Lockheed

**FIGURE XIV.2. 1975 AIR PASSENGER TRAFFIC FLOWS ON MAJOR SCHEDULED AIRLINES.**  
 (Billions of revenue passenger-miles)

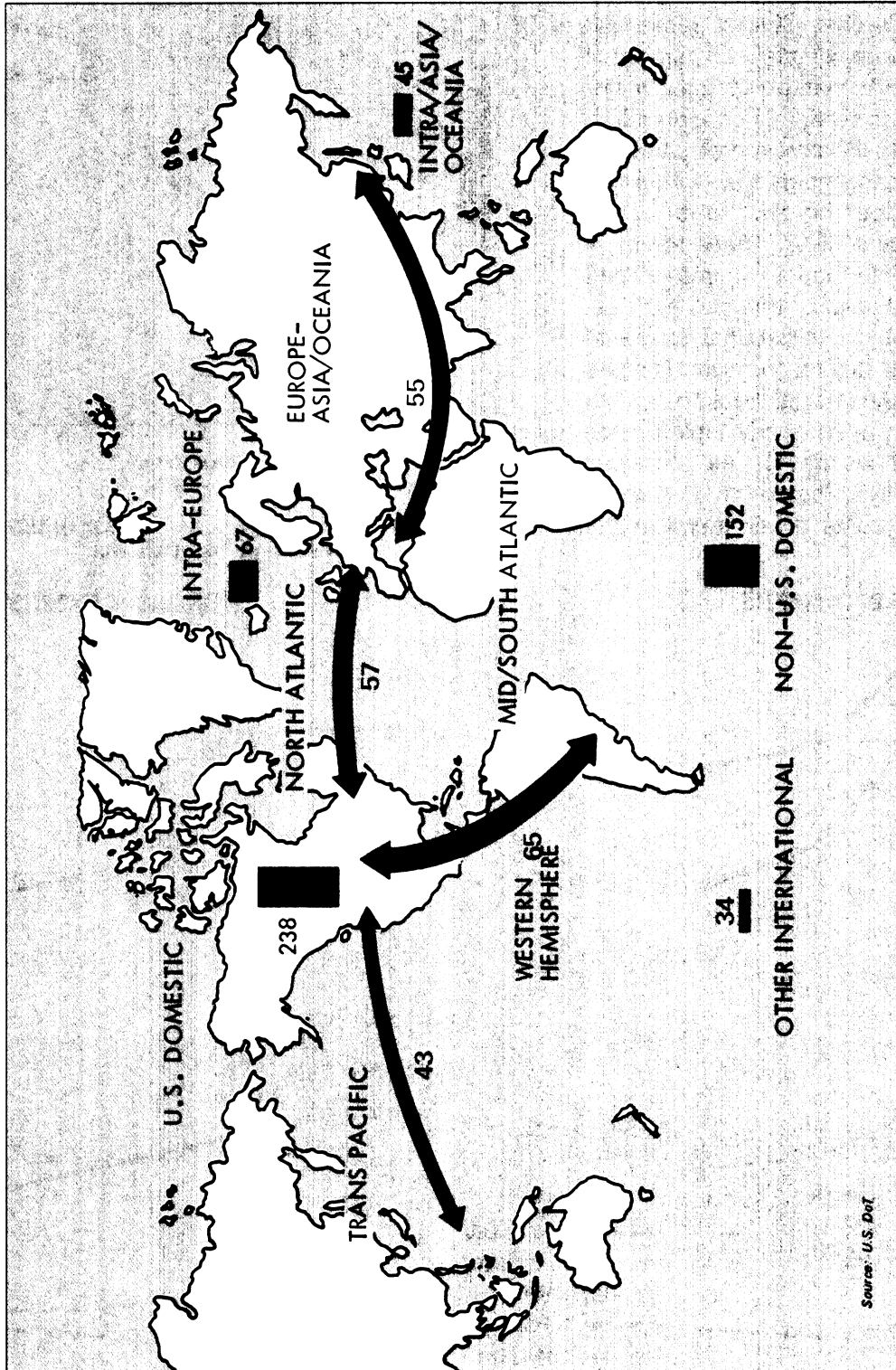


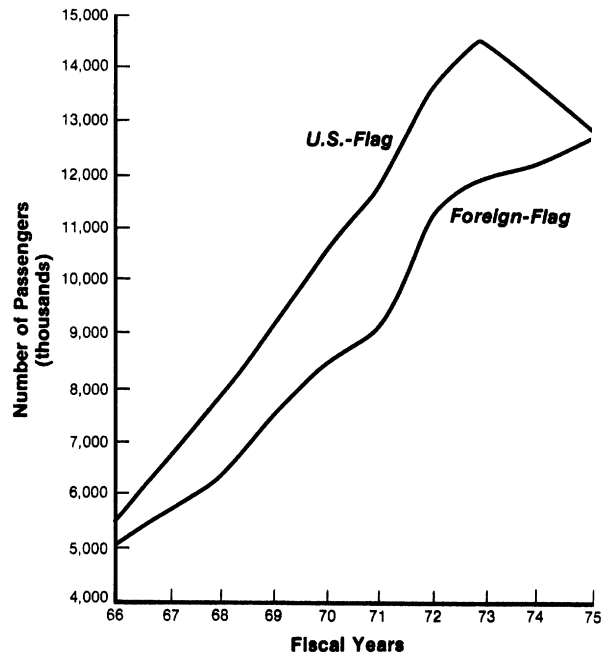
FIGURE XIV.3. PROJECTED 1985 AIR PASSENGER TRAFFIC FLOWS ON MAJOR SCHEDULED AIRLINES.

(Billions of revenue passenger-miles)

Source: U.S. DoT

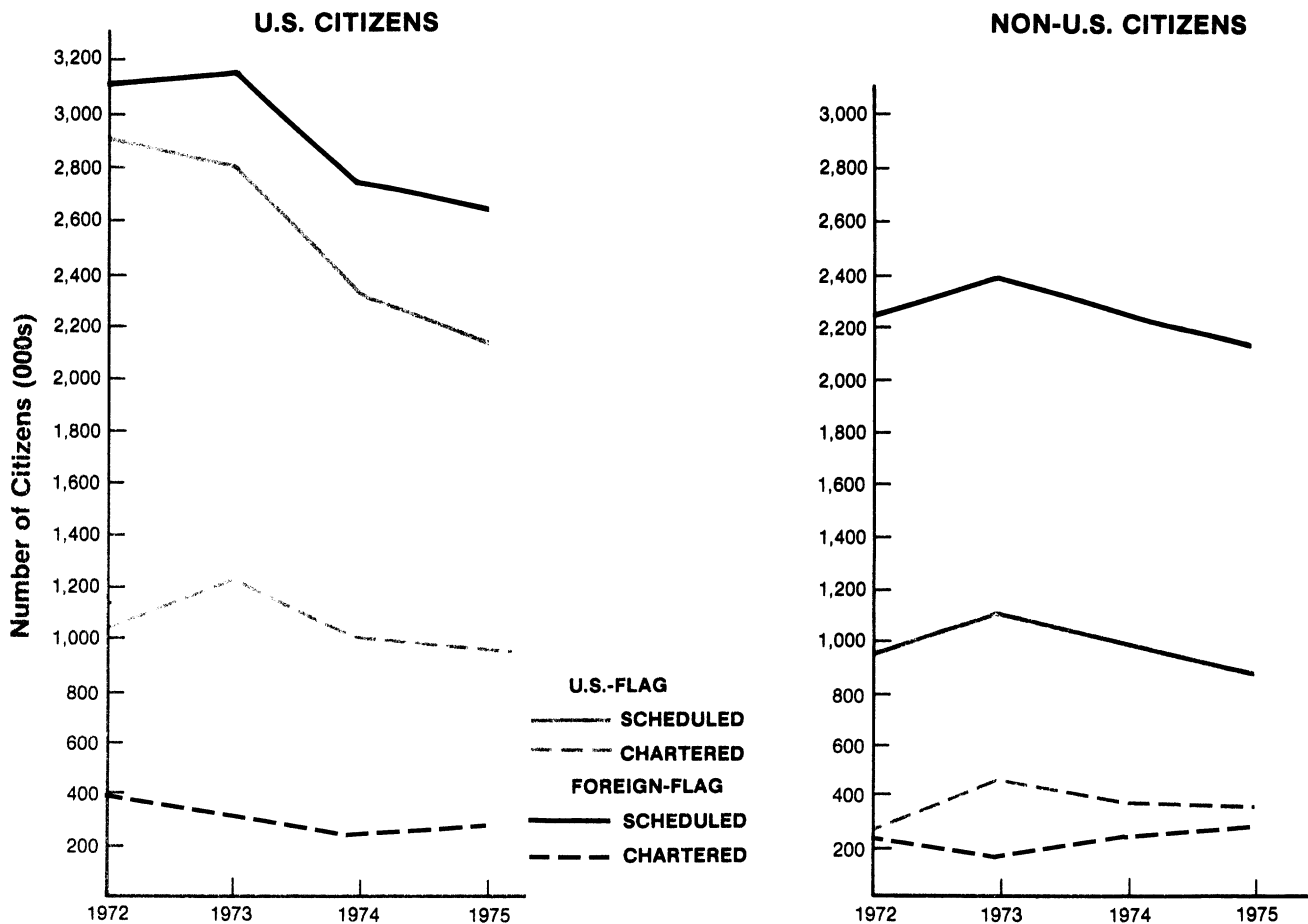
carriers. This is in response to the increase in tourist over business traffic. From 1968 to 1974, U.S. scheduled traffic on the transatlantic routes increased 52 percent while U.S. charter traffic went up 240 percent. Charter passenger traffic accounts for approximately 25 percent of the total North Atlantic market, where a major portion of this charter service is concentrated.

In 1975, almost 70 percent of all North Atlantic scheduled passengers flew with a discounted fare. The dramatic shift toward such fares is shown in figure XIV.7. These trends in fare structure have tended to increase load factors at a reduced level of revenue per passenger. Consequently, international air travel has become a better buy for the user. Despite fare increases based on rising costs (in particular, fuel costs which have nearly tripled since 1973), international air travel has remained economically attractive. Figure XIV.8 demonstrates the relative costs of air travel in the



Source: Immigration and Naturalization Service.

Figure XIV.4. Comparison of Growth of U.S. and Foreign-Flag Carriers.



Source: Immigration and Naturalization Service.

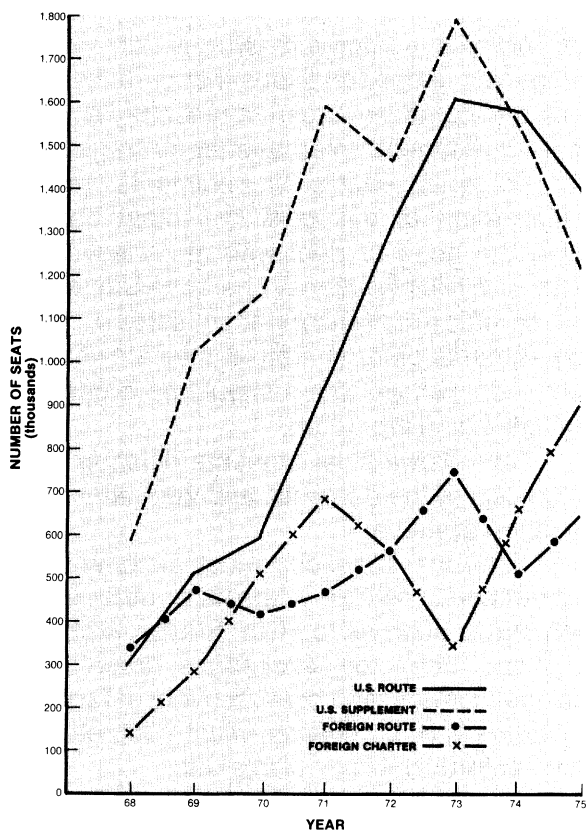
Figure XIV.5. North Atlantic Passenger Travel By Flag of Carrier.



North Atlantic compared to the consumer price indices in major North Atlantic countries. The effects of the new low fares are evident in this figure.

U.S. policy actions regarding fares and services in the future will continue to seek liberalization of charter regulations, together with part charter authority on scheduled flights to improve service availability and operating efficiency. Liberalization of charter policy by foreign governments is also necessary since many governments have seen charters as detrimental to their scheduled airlines and have tried to prevent charter services from competing directly with the national carrier. A significant factor in U.S. policy planning should be the recognition of the strong U.S.-flag share of the charter markets compared to the scheduled markets (as illustrated in fig. XIV.6). As charters gain a larger share of the total travel market, the U.S. carriers' inherent advantages should help redress the current flag imbalance in scheduled service.

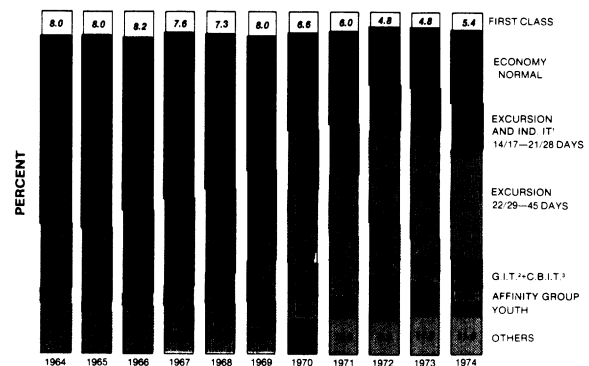
The number of cities receiving direct international service, particularly to destinations



Source: Civil Aeronautics Board.

Figure XIV.6. Number of Seats on U.S. International Passenger Charter Flights.

across the North Atlantic, is a further consideration in viewing the long-term future of international air travel. Expansion of international air service is to be encouraged to make travel more convenient to the user. However, concern for the convenience of the user must be balanced with recognition of the requirement for economic viability. The growth of passenger and cargo traffic to economically supportable levels is the appropriate basis for the opening of new gateway points. The effect on existing gateway points when they lose portions of their traffic as well as the consequences of allowing nonstop service from too many cities could create a potentially harmful splitting of traffic. In that case, uneconomic carrier load factors would argue against undue proliferation of U.S. gateway points.



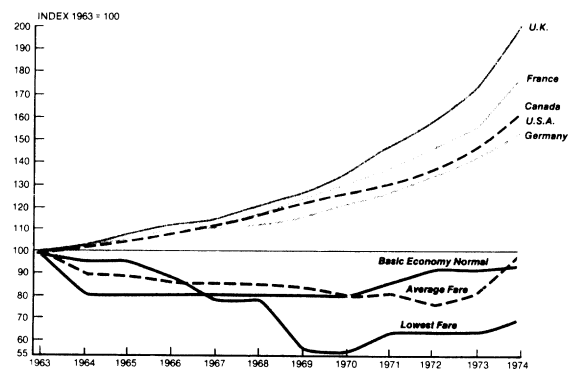
Source: International Air Transport Association.

\*Individual inclusive tour.

†Group inclusive tour.

‡Contract bulk inclusive tour.

Figure XIV.7. Passenger Distribution on North Atlantic Scheduled Services by Fare Type.



Source: International Air Transport Association.

Figure XIV.8. North Atlantic Fare Indices Compared with Consumer Price Indices.

## **INTERNATIONAL AIR FREIGHT**

International air cargo operations respond to the needs of the shipping public for the fast and reliable transport of relatively high-value and/or short-life goods.

International air freight is expected to grow somewhat faster than domestic air freight over the next 15 years, largely because of rapid growth in cargo traffic between the United States and developing nations in Asia/Oceania and Latin America. Air freight movements between the United States and Europe—already highly developed markets—will grow at about the same rate as U.S. domestic air freight traffic. (Past trends in air freight growth are depicted in fig. XIV.9. Estimates of future growth by market area are shown in table XIV.1.)

Much of the growth of international air cargo service is attributable to the stimulation of competition by all-cargo scheduled airlines, which must be both innovative and efficient to survive. Combination carriers have responded to this stimulus with all-cargo operations and increased use of larger cargo holds in wide-bodied aircraft through containerization. All-cargo services provide a distinct benefit to the shipper, and their expansion should be encouraged where economically justified. In granting authority for such operations, recognition should be given to the need for routing and scheduling flexibility, which may differ considerably from passenger routing and scheduling patterns.

To stimulate competition for entry into new air freight markets, the Civil Aeronautics Board should grant separate certificates for combination passenger/cargo authority and for freighter authority, after separate determinations of public convenience and necessity. In addition, consideration should be given to awarding to U.S. all-cargo carriers—after due notice and hearing and a finding of public convenience and necessity—authority for international scheduled freighter services on an area basis.

*Cargo Rates.* Cargo rates have become needlessly complex and should be made as simple and as cost-related as possible. The Civil Aeronautics Board should prevent the use

of rates below the cost of the most efficient all-cargo carrier. Accepted rates should then apply to the cargo operations of combination carriers, whether these are all-cargo or use the lower hold of passenger aircraft.

Similarly, the tariff structure should be based on general commodity rates rather than specific commodity rates, which are unfair to both shippers and carriers since rate differences do not reflect inherent carrier cost differences. Specific commodity rates should apply only to selected items with high minimum weights. They should be initiated only for purposes of traffic generation, and should not become permanent except in certain cases in which special handling is required.

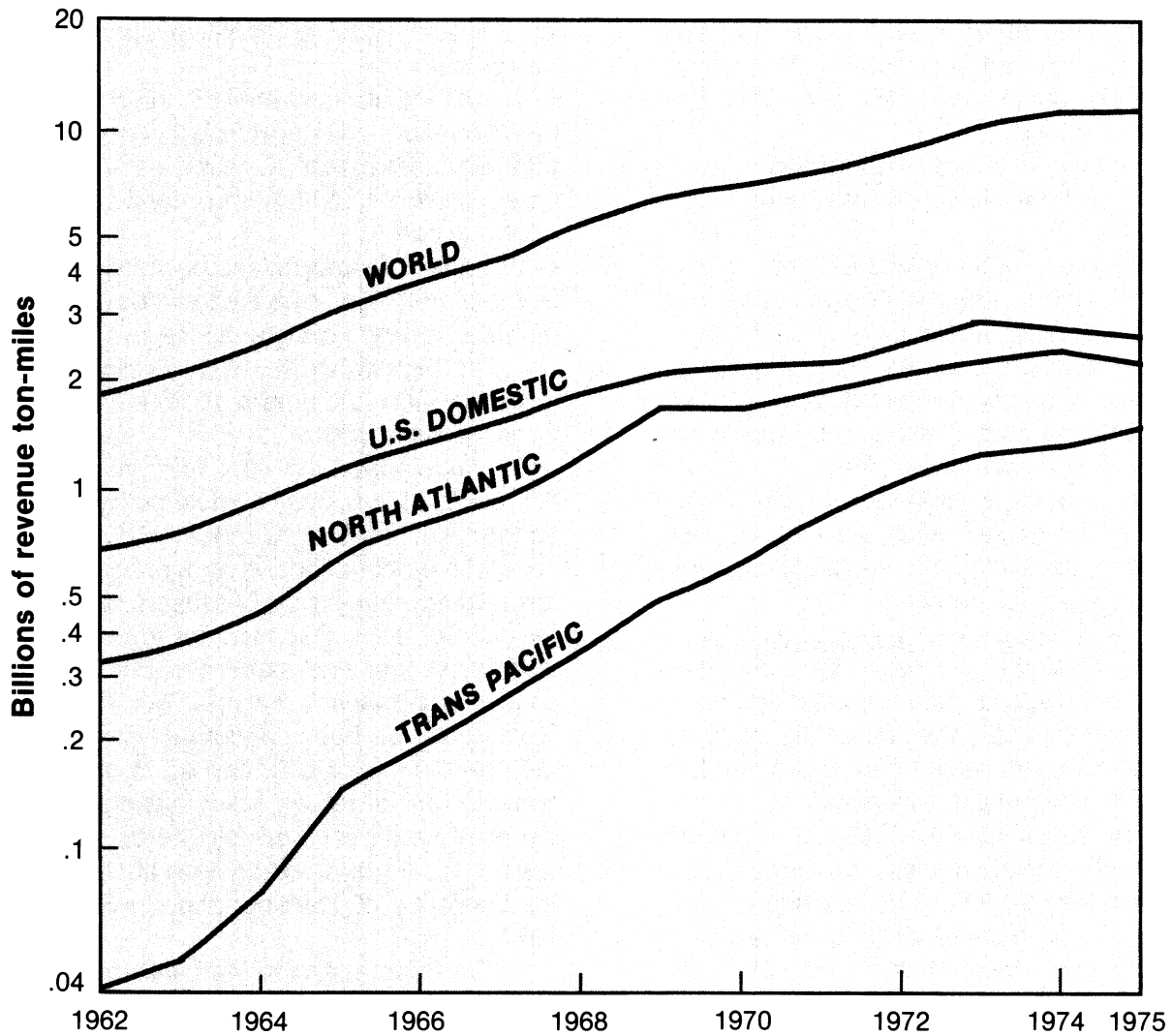
With the further introduction of wide-bodied, all-cargo aircraft, appropriate weight breaks reflecting large volume cost savings should be permitted.

## **INTERNATIONAL AIR TRANSPORT ISSUES**

The basic aim of U.S. international aviation policy is the same as that of its domestic policy: efficient and economical air transportation for the Nation's commerce by privately owned companies under conditions that permit a well-managed company to earn a reasonable return on its investment. International air transportation presents special impediments to the achievement of this goal, the most obvious being the need to deal with many sovereign nations. While others may share the U.S. objective of efficient transportation service, many governments differ sharply in their views as to how such transportation should be organized, regulated, and promoted.

The following list presents differing characteristics of the domestic and international air transport systems:

- International practices must accommodate the frequently diverse interests of other sovereign states such as tourism, foreign exchange balances, technology exchanges, protection of national carriers, and cost recovery of facilities.
- Private U.S. companies must compete with State enterprises in most markets.
- Competition in international air transportation is limited by government policy in almost all countries.



Source: Boeing Commercial Airplane Company, *Air Freight Markets, A Perspective/A Forecast, 1976*.

Figure XIV.9. Trends in Air Freight Growth.

Table XIV.1  
World Scheduled Air Freight Forecast  
(Millions of revenue ton-miles)

Market	Actual				Forecast			Average Annual Growth (percent)					
	1960	1970	1974	1975 <sup>1</sup>	1976	1980	1985	1960-1970	1970-1974	1974-1975	1975-1976	1976-1980	1980-1985
U.S. Domestic	500	2,216	2,808	2,654	2,840	3,723	5,222	16.1	6.1	(5.5)	7.0	7.0	7.0
Other Domestic	257	727	1,138	1,257	1,383	2,176	3,503	11.0	11.9	10.5	10.0	12.0	10.0
Total Domestic	757	2,943	3,946	3,911	4,223	5,899	8,725	14.5	7.6	(0.9)	8.0	8.7	8.1
North Atlantic		1,749	2,281	2,087	2,087	2,839	3,982		6.9	(8.5)	0.0	8.0	7.0
North America-Asia/Oceania		487	1,313	1,411	1,489	2,260	3,640		28.0	7.5	8.5	11.0	10.0
Western Hemisphere		313	568	619	687	1,120	1,974		16.1	9.0	11.0	13.0	11.0
Europe-Asia/Oceania		456	1,032	1,115	1,221	1,990	3,204		22.0	8.0	9.5	13.0	10.0
Intra-Asia/Oceania		92	264	301	343	579	932		30.0	14.0	14.0	14.0	10.0
Intra-Europe		497	797	781	812	1,105	1,550		12.5	(2.0)	4.0	8.0	7.0
Other International		721	981	1,079	1,198	1,953	3,441		8.0	10.0	11.0	13.0	12.0
Total International	641	4,315	7,236	7,393	7,837	11,846	18,723	21.0	13.8	2.2	6.0	10.9	9.6
Total Scheduled	1,398	7,258	11,182	11,304	12,060	17,745	27,448	17.9	11.4	1.1	6.7	10.1	9.1

<sup>1</sup>Preliminary estimate for 1975.

Source: Lockheed, *World Air Traffic Forecast, 1976*.

- Routes are determined through bilateral agreements, and tariffs are set by the International Air Transport Association subject to government approvals.
- At least two carriers are authorized to operate on most international routes, even those with light traffic.
- On many international routes, the ratio of daily flights to the number of competing carriers is much lower than domestically. On only two or three intercontinental routes, does any carrier operate more than once-daily service. In many international markets, direct services are operated only two or three times a week.
- The dense domestic markets provide greater opportunity for carrier efficiency and effective competition, as carriers have more flexibility in adjusting capacity to demand.
- Long route segments, multiple time zone changes, and airport curfews inhibit carrier flexibility in arranging intercontinental schedules.
- Many travelers plan their international flights far in advance and have been accustomed in the past to gather at gateway points.
- International aircraft (because of economic and safety considerations on long intercontinental segments) are usually larger, compounding the problem of tailoring the supply of seats and frequency of flights to meet the traffic demand.
- Some foreign states, seeking foreign exchange earnings from American tourists, underwrite their national carrier's losses to maintain large capacity to the United States.
- Foreign carriers sometimes seek below-cost rates as a means of promoting their nation's exports.

Important considerations in developing U.S. international air transportation policy are:

- To meet the needs of consumers by providing for the international transportation of people, mail, and goods safely, efficiently, and at reasonable costs, wherever a substantial need for air transport exists;
- To provide a regularly scheduled service to international points;
- To the extent not inconsistent with the above, to provide low cost service to the nontime-sensitive passenger.
- To support the continued development of civil aeronautics and air commerce and the ability of private enterprise U.S. carriers to en-

joy fair and equal competitive opportunity in foreign markets;

- To provide for a private U.S. international air transportation industry that is economical and efficient and will generate sufficient earnings to attract private capital and create new job opportunities;
- To contribute toward, and be consistent with, U.S. national objectives in the areas of national defense, foreign policy, and foreign commerce.

On September 8, 1976, President Ford issued a new statement of international air transportation policy of the United States, which superseded the 1970 international aviation policy statement. The new policy provides strong and positive guidance in our negotiations with other nations. Also, a principal goal in formulating new policy has been to preserve the right of the U.S. consumer to both scheduled passenger and cargo services, and low-cost charter service options. But the United States also has been concerned with providing the opportunity for U.S. airlines to earn a reasonable rate of return. Many basic policies of the new statement were similar to the objectives of the Federal Action Plan announced by the Secretary of Transportation in September 1974.

The Federal Action Plan was designed to produce short- and long-term improvement in the economic viability of U.S. international air carriers. The following subsections report on steps taken in 1975 as part of the Federal Action Plan.

**Route Rationalization.** As the competitive environment has changed, the executive branch has encouraged route restructuring and suspension of certain operations for U.S.-flag carriers. Two route transfer and suspension agreements were implemented during 1975, the first between Pan American and TWA, the second between American and Pan American. These have resulted in suspension of service on a number of routes and realignment of the competitive balance in the North Atlantic; the North, Central, and South Pacific; and the Caribbean. Although complete results of these route realignments are not yet available, it appears that this restructuring is helping to produce a more efficient U.S. carrier route structure.

**Excess Capacity.** Most international air

fares are set, subject to the review of governments, by the International Air Transport Association (IATA). Airline capacity and flight frequency are, therefore, the principal factors in competition in international air transportation, particularly in scheduled service, where market share rather than economic viability is often the dominant factor influencing non-U.S. carrier decisions. Excess capacity results in inefficient aircraft utilization, operating losses for the carriers, and higher than otherwise necessary fares for the public.

The U.S. Government has taken the position that capacity should be based on traffic demand and has initiated discussions with foreign governments to review the excess capacity situation. Capacity control agreements have now been approved between U.S. carriers and several foreign carriers and intercarrier meetings are continuing with other foreign airlines.

Efforts in 1975 to reduce capacity met with some success. Scheduled capacity in the North Atlantic market decreased an average of 8.8 percent during the first 9 months of 1975, from the first 9 months of 1974 (see fig. XIV.10). The

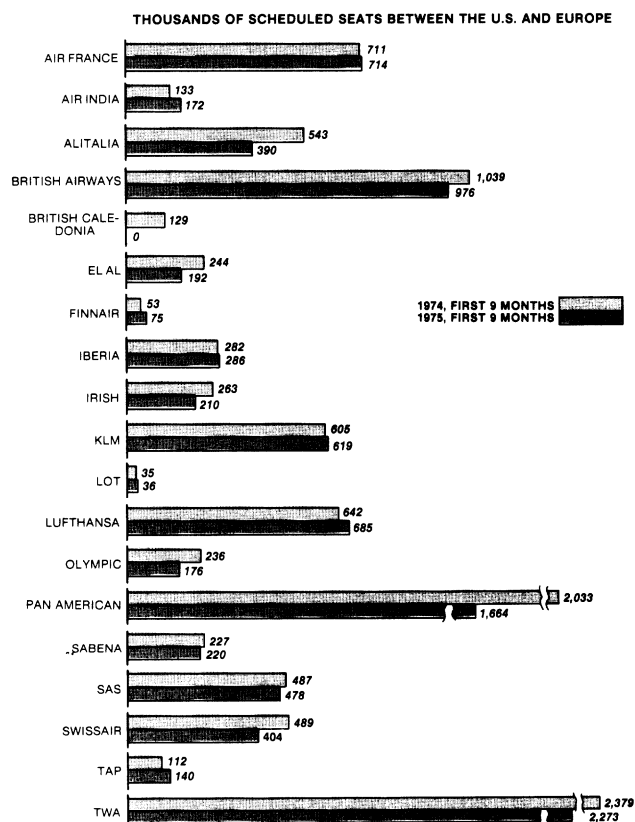
capacity offered by two major U.S. passenger carriers declined 10.5 percent; that offered by foreign carriers declined 7.4 percent, despite some capacity increases by leading foreign carriers.

**Tariff Structure and Enforcement.** Despite the general fare increases of the past few years, the economic viability of U.S. carriers has not improved adequately. The wider use of lower promotional fare arrangements, introduced to compete with charter flights and attract new customers, has tended to dilute revenues. About 70 percent of all North Atlantic passengers on scheduled flights use some type of promotional fare.

In October 1975, the CAB moved to ensure that scheduled fares would be compensatory and stated that cross-subsidization of discount passengers by full-fare passengers should be significantly reduced. It issued tariff structure guidelines that recognized the need for a simplified, cost-based fare structure, the carrier's need for improved profitability, and the interrelationship between scheduled fares and charter fares.

**Mail Rates.** The CAB has increased temporary U.S. Postal Service rates for the transport of international mail by U.S.-flag carriers by nearly 25 percent since 1974. The investigation to determine fair and reasonable permanent international mail rates for U.S. carriers for the period since March 1974 is still pending at the CAB. In its investigation, the CAB is required to take into account the Universal Postal Union (UPU) rates. In addition, as directed under the International Fair Competitive Practices Act, the CAB shall consider the competitive disadvantage to U.S.-flag carriers resulting from their foreign competitors' receiving the higher UPU rates for carriage of U.S. and foreign mail.

**Foreign Protective Practices.** Protectionist practices are often subtle and difficult to document. One of the more blatant practices is a ground-handling monopoly that denies U.S. carriers the freedom to choose a ground-handling contractor, and that may even prevent the carriers from servicing their own flights. Difficulties in currency conversion, restrictions on interline feed, and administrative delays are other examples of problems that make operating in a foreign country more difficult.



Source: International Air Transport Association.

Figure XIV.10. North Atlantic Airline Capacity.

The United States has seen a sharp increase in the costs of landing and enroute charges, noise surcharges, and other fees. We have no objection to the recovery by foreign governments of up to 100 percent of the costs of providing airport and airway services, but we believe strongly that the charges should be based upon the costs of the services. Excessive charges are unfair and if they are not assessed equally against all users, including the national carriers of the foreign government, they are discriminatory as well.

The International Air Transportation Fair Competitive Practices Act of 1974 requires that the Department of Transportation survey foreign user charges to determine whether they are unreasonably excessive or discriminatory. If the Secretary of Transportation finds that a charge unfairly discriminates against U.S. carriers, the Secretary is required to find a remedy to the inequity by negotiation or, as a last resort, unilateral action. Other forms of discriminatory or unfair competitive practices must also be kept under review by Federal agencies with the intent of correcting the inequitable practice.

The Secretary of Transportation has determined that the user charges imposed by Australia, Italy, and the United Kingdom are discriminatory. The Department of Transportation has strongly supported and participated in bilateral negotiations with these countries. We are preparing to implement compensatory charges against Italy soon if a satisfactory solution is not found very soon. In addition, fact-finding discussions have been held with Canada and Greece; also certain practices of India, Iran, Japan, and Venezuela are under review.

The preferred means of ensuring economic stability and efficiency is through operation of free-market forces. The United States recognizes, however, that in international services there are fundamental restraints against the operation of free competition. Therefore, the United States must continue a system of government oversight and regulation of international fares and rates. The United States will continue to recognize the International Air Transport Association (IATA) as the principal vehicle for the negotiation of fares and rates, but it will also encourage a fare structure that relates to cost of service and eliminates price

discrimination. Such a fare structure is also likely to eliminate unnecessary complexity, while still encouraging the availability of price and quality options. It would permit unsubsidized U.S. air carriers to operate efficiently, and protect the public interest.

Under the system of bilateral air transport agreements to which the United States is a party, the so-called "Bermuda principles" permit scheduled air carriers to be the principal regulators of capacity and frequency levels. Governments exercise oversight on an ex post facto basis only. The Bermuda principles, foundation for all subsequent air agreements, were derived from the 1946 United States-United Kingdom bilateral air agreement. This bilateral agreement was cancelled this year by the United Kingdom, and its provisions will end within 1 year. Negotiations are underway to design a new agreement. The United States will continue to support the Bermuda principle where practiced and will also seek to have new provisions included that will be responsive to changing conditions in international aviation.

It should be emphasized to all countries that bilateralism is a two-way street and the extension of liberal air access to U.S. points must be coupled with equal generosity by the foreign government.

The past 2 years have made it clear that there has been (and in some cases continues to be) excess capacity on international routes. Neither the efficient use of energy resources nor realistic product pricing can tolerate such waste. While temporary intercarrier agreements designed to regulate scheduling and capacity can be an important means of dealing with situations where rapid adjustments in capacity levels are needed for a short period of time, such agreements should not, however, become a permanent part of the international regulatory structure. They will be supported only when there is special need for short-term agreements and will be subject to monitoring and approval by the CAB.

On both these issues, U.S. policy will be to seek negotiated remedial solutions where problems exist. Only as a last resort will unilateral action be taken to correct the problem.

***Fly-U.S.-Flag Program.*** The "fly-U.S.-flag" program seeks to develop appropriate, practical means by which the U.S. Government might

foster greater patronage of the U.S.-national-flag carriers, both scheduled and supplemental, both passenger and cargo, in international service. This program, enacted by the Congress, imposes no restrictions on foreign competition for private-sector travel. The U.S. objective, consistent with its bilateral agreements, is to help provide an opportunity for U.S. carriers to obtain an equitable share of the market.

The General Services Administration has issued revisions to the Federal procurement and travel regulations to provide that transportation services procured by or for the U.S. Government shall be, to the maximum extent feasible, on U.S.-flag carriers.

The impact of these programs is reflected in the forecasts of international aviation activity presented earlier in this chapter.

***Air Piracy and Terrorism.*** The Government has a strong and continuing interest in control and elimination of threats to the safety of air passengers and crew. The Government has little control over the security procedures adopted by foreign governments; however, it requires all air carriers to use FAA-approved security precautions in their operations within U.S.

territory. In addition, U.S.-flag carriers must maintain security procedures on flights departing from foreign territory with a U.S. destination point. It will also use its influence wherever appropriate to support programs and procedures designed to eliminate air piracy and terrorism in any country. As indicated in chapter VIII, terrorism will continue to represent a threat to air travel in the future. Continued improvement in security programs will therefore be required.

***Joint Ventures and the Sharing of Technology.*** American predominance in the production and export of airframes, engines, and related aeronautical equipment has been unquestioned in the past; but the increasing capabilities of other nations, plus the high costs and attendant risks of new product development appear to point toward increased likelihood of greater competition. This, in turn, requires continued governmental monitoring to ensure optimal effects on the national security and well-being, as well as the potential reductions in risk to the manufacturers involved, and the potential for products which will meet user needs better and/or more economically.





# CHAPTER XV

## International Marine

### INTRODUCTION

The importance of international marine transportation to the United States cannot be over-emphasized. More than 99 percent of the commodity tonnage moving in overseas foreign trade is carried by water. The volume of this trade has increased approximately 80 percent over the past decade, from 422 to 764 million short tons, and it is increasing at a much greater rate than domestic waterborne commerce. Table XV.1 lists the principal commodities in foreign waterborne commerce for 1974. Of significant importance is the fact that oil imports are carried exclusively by ships.

**Table XV.1**  
**Principal Commodities in Foreign Waterborne Commerce, 1964 and 1974**  
(Percent of tonnage)

Commodity	Foreign Commerce		Total Foreign and Domestic Waterborne Commerce	
	1964	1974	1964	1974
Petroleum and products	33.1	43.0	37.3	42.1
Coal and coke	12.2	10.6	16.7	13.1
Iron ore, iron and steel	16.8	10.4	11.8	9.8
Sand, gravel and stone	1.1	2.0	8.6	7.3
Logs and lumber	2.2	3.4	3.1	3.0
Grains	10.1	9.1	4.8	5.6
Chemicals	4.1	5.3	3.4	5.5
Seashells	—	—	1.9	1.0
All others	10.5	16.2	12.3	12.6

Source: U.S. Army Corps of Engineers, Waterborne Commerce of the United States, 1974.

As indicated in chapter IX, international passenger travel by water is declining in comparison to air travel. Sea travel has been relegated almost exclusively to the role of cruise travel, more oriented to the pleasure of traveling than to arriving at a destination. Proof of this statement is that there are now only 5 U.S. ports with more than 50,000 passenger departures per year by sea. They are, in order of size:

- Miami, Florida,
- Charlotte Amalie, Virgin Islands,
- New York, New York,
- Fort Lauderdale, Florida,
- San Juan, Puerto Rico.

Total passenger-miles are projected to

decline from 1,884 billion in 1975 to 1,836 billion in 1980 and 1,550 billion in 1990.

### THE U.S. MERCHANT MARINE

#### Background

The oceangoing U.S.-flag fleet operates in both domestic and international trade. The basic policy and purpose of the U.S. maritime program is set forth in the Merchant Marine Act of 1936 (as amended) which states that the United States shall have a merchant marine:

- Sufficient to carry its domestic waterborne commerce and a substantial portion of the waterborne export and import foreign commerce of the United States and to provide shipping service essential for maintaining the flow of such domestic and foreign waterborne commerce at all times;
- Capable of serving as a naval and military auxiliary in time of war or national emergency;
- Manned and operated under the U.S. flag by citizens of the United States insofar as may be practicable;
- Composed of the best equipped, safest, and most suitable type of vessels, constructed in the United States and manned with a trained and efficient citizen personnel;
- Supplemented by efficient facilities for shipbuilding and ship repair.

Programs to aid the development, promotion, and operation of the U.S. Merchant Marine are administered by the Maritime Administration. Its central role is the administration of the merchant marine subsidy program. Other functions of the Maritime Administration include: the conduct of research and development activities to improve the efficiency and economy of the merchant marine; the operation of the U.S. Merchant Marine Academy and the administration of a grant-in-aid program to other specified maritime academies; the administration of a War Risk Insurance Program which insures operators and seamen against losses caused by hostile action if domestic commercial insurance is not available; the maintenance of a National Defense Reserve Fleet of govern-

ment-owned ships and the operation of programs to develop ports, facilities, and intermodal transportation systems related to marine terminals.

Examination and licensing of merchant marine personnel is the responsibility of the Coast Guard. It also regulates or controls ship documentation and repairs, vessel movements in selected ports, the handling, movement, and stowage of hazardous materials, and matters of environmental protection.

### **Subsidy and Guarantee Programs**

**Construction Differential Subsidy.** To equalize the disparity between U.S. and foreign shipbuilding prices, the Maritime Administration is authorized to pay a construction differential subsidy (CDS). To be eligible for CDS, a vessel must be built in the United States, owned by an American citizen, manned by an American crew, and operated under the U.S. flag on the Nation's essential foreign trade routes. CDS payments during fiscal year 1975 amounted to \$239.8 million for the construction of 39 new ships and the reconstruction of 5 vessels. Total construction and reconstruction costs for these 44 vessels will eventually come to almost \$2.5 billion, of which \$816 million will be paid under the CDS program over a period of years.

The Merchant Marine Act of 1970 was intended to arrest the decline of the U.S. merchant fleet and to provide an opportunity for balanced growth. Progress toward this objective has been significant. Despite the recent decline of the tanker market, there is evidence of demand for new U.S. ships in the near term, and long-term prospects are promising.

**Operating Differential Subsidy.** The Maritime Administration is authorized to pay an operating differential subsidy (ODS) to U.S. shipping companies to offset the higher cost of operating a vessel in foreign trade under the American flag rather than under a foreign flag. In past years, this form of aid generally covered wages, insurance, maintenance and repairs not compensated by insurance, and subsistence of officers and crews of passenger vessels. However, to reduce the industry's dependence upon subsidy, recent contracts do not provide for subsidy payments for hull and machinery premiums or for maintenance and uninsured repairs. All modern cargo vessels, including

bulk carriers, that operate in an essential foreign trade are eligible for ODS. Total payments during fiscal year 1975 amounted to \$243.2 million.

The operating differential subsidy program assures that American-flag service will be available for U.S. foreign commerce without interruption, during both peacetime and wartime. Without the subsidized fleet, the United States would have to wholly depend on other countries for vital shipping services and national defense capability. The ODS program supports breakbulk vessels, barge carriers, roll-on/roll-off ships, and container ships.

The subsidized fleet has become notably more modern and productive since 1970. The average age of subsidized vessels decreased from 12.7 years in fiscal year 1970 to 10.4 years in fiscal year 1975. The number of vessels in the subsidized fleet has declined from 215 ships in 1970 to 190 today. At the same time the total deadweight tonnage<sup>1</sup> of the fleet has increased by almost 30 percent. In terms of dollars adjusted for inflation, the subsidy cost per measurement ton deliverable by the subsidized fleet declined from \$2.99 in 1969 to \$2.12 in 1975.

Furthermore, crew costs, one of the biggest expenses for shipping companies, are coming under closer control, largely as a result of the willingness of maritime unions to reduce manning scales on new vessels. While vessel sizes and speeds have been increasing, crew sizes have been declining. Where older vessels customarily carried crews of 40 to 50 men, modern U.S.-flag ships require crews of only 25 to 30. Even the ultralarge 400,000-ton tankers will carry crews of only 26.

The primary basis for taxpayer support of ship operations is the need to assure a national capability to move military materiel and essential raw materials in wartime without heavy dependence on foreign-flag vessels. Without the ODS program there would be a significant shortage in sealift capability in a major NATO conflict even with the shipping assistance expected from our NATO allies. The subsidized U.S.-flag fleet would have a vital role in this

<sup>1</sup>Deadweight tonnage (DWT). The total weight-carrying capacity, expressed in long-tons (2,240 pounds), including cargo, fuel, fresh water, stores, crew, etc. DWT is the difference between a vessel's loaded and lightweight displacement.

situation, and even more so in other overseas contingencies where NATO ships might not be available.

Under current policies, the ODS program offers clear prospects for cost reduction over the long term. In relative terms, despite current absolute increases, the subsidy requirement is diminishing and will continue to decline as per capita income in foreign maritime countries increases. Another factor operating to reduce subsidy requirements is the increasing capital intensity of the maritime industry. The Maritime Administration does not provide ODS for very large crude carriers or liquefied-natural-gas vessels because the crew costs, which dominate ODS payments, account for only a tiny fraction of the total costs of these ships. A similar effect is increasingly evident in the case of capital-intensive container ship systems operating in high-volume trades. Operating subsidy requirements are also diminished as U.S. crew complements are reduced.

**Federal Ship Mortgage Insurance Program.** Since its earliest days, the Federal Government has taken special measures to aid and maintain the United States merchant fleet as an instrument of trade and as a naval auxiliary, and to maintain a mobilization base of shipyard facilities and trained seagoing and shoreside manpower. Title XI of the 1936 Merchant Marine Act provides Government guarantees of debts incurred to finance vessel construction.

Vessels financed under Title XI must be documented by the U.S. Coast Guard and they must be designated "class A-1" by the American Bureau of Shipping, with all certificates and recommendations necessary for retention of class, or comply with such other standards as are prescribed by the Secretary of Commerce. Further, they must meet all requirements of applicable laws, treaties, and conventions, and they must be built in the United States.

The maximum shipbuilding cost that may be guaranteed varies. The limit is 75 percent of the actual cost in the case of vessels that are built with construction differential subsidy and 87-1/2 percent for non-CDS vessels. To qualify, the non-CDS vessels must meet specific criteria with respect to design, tonnage, horsepower, and/or speed. If their costs are to be included in the actual cost of a vessel, materials used in its construction must have been

produced in the United States unless it is determined that those materials are not available in the United States.

The recipient of Title XI aid must pay for the Government's guarantee. The statute requires the Secretary of Commerce to charge an "annual guarantee fee," and there is an initial investigation fee as well.

Title XI aid has provided a significant incentive for modernizing and expanding our merchant fleet. Government insurance and guarantees have attracted debt capital from private investors at reasonable interest rates on a long-term basis. Because of the cyclical and capital-intensive nature of the shipping business, this debt capital would not otherwise be available or would require a higher rate of interest and much shorter maturities, or would not be available at all.

The success of the Title XI program in stimulating vessel construction is reflected in the approval of guarantees for approximately \$4 billion in a period of just over 5 years. As of December 31, 1975, active applications for guarantees of \$1.3 billion were pending. Aggregate commitments of about \$1.7 billion are anticipated during fiscal years 1976 and 1977, and the total outstanding Title XI debt at the end of fiscal year 1978 will approach the current ceiling of \$7 billion.

This program has been self-supporting since its inception. There have been only 10 defaults, involving a net loss after resale of the vessel of about \$14.6 million. This is charged against the Federal Ship Financing Fund, into which investigation fees and guarantee fees are deposited. The fund has been increased by about \$11 million after expansion in 1974 and 1975, and now has a balance of over \$88 million.

### **National Security**

**Operations in a Major War.** Under mobilization conditions, the entire U.S.-flag merchant fleet can be requisitioned by the Secretary of Commerce. Operational control of the fleet after requisitioning lies with the National Shipping Authority, an agency of the Maritime Administration whose functions in this area essentially parallel those of the World War II War Shipping Administration. Specific oceanshipping resources are allocated by the National Shipping

Authority to meet national requirements, both military and economic, under guidelines established by the Office of Emergency Transportation in the Department of Transportation. This office, in turn, receives broad policy guidance from the Federal Preparedness Agency in the General Services Administration.

Projections of shipping requirements and capabilities in major wars have been developed with the assistance of computerized simulations of actual wartime transportation operations. These incorporate Department of Defense projections of detailed military transportation requirements, to which are added projections of nonmilitary needs (mainly domestic offshore requirements for support of Hawaii, Puerto Rico, and Alaska). The simulations depict the postmobilization time-phased availability of ships, their speed and carrying capacity, load and offload delays plus delays for convoy assembly, and probable ship losses based on Navy submarine warfare analyses. Airlift capabilities are also accounted for. These analyses cannot yield exact forecasts, because wartime operations are subject to wide ranges of uncertainty. However, they do provide reasonable estimates of the general magnitudes of wartime ship requirements.

Recent studies of the problem include the 1972 multiagency *Sealift Procurement and National Security Study* (SPANS) plus a number of subsequent Department of Defense and Maritime Administration analyses. In every case, when compared with expected U.S.- and NATO-flag ship availability, the projected movement requirements show dry-cargo shipping capability to be marginally adequate to meet the military and economic support objectives under expected conditions of high ship attrition. Although it was explicitly considered in all of the noted studies, the effective U.S. control (EUSC) fleet of U.S.-owned, foreign-flag ships makes essentially no contribution to the general cargo delivery capability because that fleet consists almost exclusively of tankers and dry-bulk carriers.

**Operations in Nonmobilization Contingencies.** In addition to major wars, it is necessary to consider minor contingencies, or limited wars, which occur under conditions where it is not feasible to mobilize or requisition the necessary capability from the U.S. Merchant Marine.

Anticipated nonmobilization contingencies involve such actions as the resupply of allies and the deployment and resupply of relatively small U.S. forces. The Department of Defense has analyzed shipping requirements for a range of possible minor contingencies and found that they range from 52 to 145 ships in current estimates.

### **Economic Considerations**

The direct and indirect supports provided for maintaining a U.S.-flag fleet adequate for the commercial and national security purposes set forth by the Congress are expected to continue despite the existence of lower cost foreign-flag ships. Although difficult to assess quantitatively, it is clear that the U.S.-flag merchant fleet makes a significant contribution to the Nation's foreign trade in a number of ways. An open question continues to be the extent to which the statutory maritime policy of "significant" U.S.-flag carriage is being met; and if not, the benefits and costs of doing so. From the limited standpoint of economic efficiency, it would seem wise to utilize relatively low-cost maritime services wherever appropriate—typically nonliner, foreign-flag vessels. However, where regularity of service is important, and the volumes of carriage being offered by shippers are insufficient to justify ownership of their own vessels, then liner service is the desired option. U.S.-liner operators are typically members of "conferences," which are organizations of operators in a particular inbound and/or outbound trade, to arrange efficient frequency of service to ports at agreed-upon rates. Conferences are exempt from U.S. antitrust laws, but are monitored by the Federal Maritime Commission.

One problem in the maritime sector is the incidence of overcapacity on particular heavy-volume routes. Membership in U.S. conferences is open by law to vessels other than those of our trading partners; and thus operators of all flags tend to gravitate toward the potentially most lucrative segments of the sizeable U.S.-foreign carriage, particularly when excess capacity exists throughout the world, and there are constraints applied on its utilization elsewhere. Nonconference carriers may also compete for carriage on these routes, and are not bound by rate agreements reached by conference members. Thus, it is important that the

Federal Maritime Commission be able to disapprove rates found to be "so unreasonably high or low as to be detrimental to the commerce of the United States," a power it has under section 18 of the Shipping Act of 1916.

As noted above, vessel operators may agree through conference procedures on the level of rates, frequency of service, and a sharing of revenues from particular trades. However, an increasing number of countries have evinced an interest in sequestering portions of their foreign trade for their own merchant fleets. A particular example is provided by the draft *Code of Conduct for Liner Conferences*, prepared under the auspices of the United Nations Conference on Trade and Development (UNCTAD).

This multilateral agreement would reserve 40 percent of trade between signatories for each of the two trading partners' merchant marines leaving only 20 percent of such trade available to competing shipping from other nations, and reducing the economic efficiencies available from free international competition. The continuing issue for examination here will be how best to acknowledge the desires of developing nations for their own merchant fleets, while maintaining a system of economically efficient international marine transportation in which some nations have long-established investments and competence in providing such service between nations other than their own.

Another topic of continuing concern to the United States and some other nations is the possibility that nationally owned maritime vessels will be used to undercut economically viable shipping services in the short run, in order either to engage in economic warfare, or to subsequently impose monopoly pricing on foreign goods movements.

To the extent that the operations of the Soviet commercial fleet in the Atlantic and Pacific trades give rise to such concerns, they may be lessened by the recent memorandum of agreement in which the Soviet Ministry of Merchant Marine stated its intention to pursue conference membership in these trades. The economic welfare of both shippers and carriers in the foreign commerce of the United States must continue to be a topic of attention by the Federal Government.

An important commercial benefit provided by the American maritime industry is the major contribution it has made in the advancement of worldwide shipping technology in the decades since World War II. Since the Mariner class freighter development of the 50's, virtually every major advance in cargo ship design has been pioneered by United States naval architects, builders, and carriers, including the container ship, the lighter-aboard-ship (LASH) barge carrier and the sea barge ship (SeaBee), the development of the first liquefied-gas carrier, and the advancement of roll-on/roll-off technology. The worldwide shipping industry has followed our lead in many of these areas. While it is difficult to quantify this contribution of the U.S. maritime industry, commerce in general has benefited tremendously, and U.S. commerce continues to benefit.

### **The U.S. Merchant Fleet**

***The U.S. Merchant Fleet Today.*** As of April 30, 1976, the active merchant fleet under the U.S. flag consisted of 543 vessels over 1,000 deadweight tons. In addition, there were 253 vessels in the National Defense Reserve fleet and 48 others inactive. Table XV.2 shows the present makeup of the U.S. oceangoing fleet and figure XV.1 displays the active fleet. As of December 31, 1974, parent companies located and incorporated in the United States also owned 706 foreign-flag merchant ships either directly or through a foreign subsidiary company. These vessels, which constitute the effective U.S. control fleet, have a total capacity of 52.8 million deadweight tons and an average capacity of almost 75,000 deadweight tons. Almost 72 percent (508) were tankers, 16 percent (112) were bulk and ore carriers, and 12 percent (86) were freighters.

***The U.S. Merchant Fleet of the Future.*** Perhaps the most significant change in waterborne transportation over the past 30 years has been the tremendous increase in the size of tankers. The T-2 tanker of the 1940's had a capacity of 16,600 deadweight tons. Today's supertankers are as much as 32.5 times bigger. The largest one presently afloat is under foreign flag and has a capacity of 540,000 deadweight tons (170 million gallons). Figure XV.2

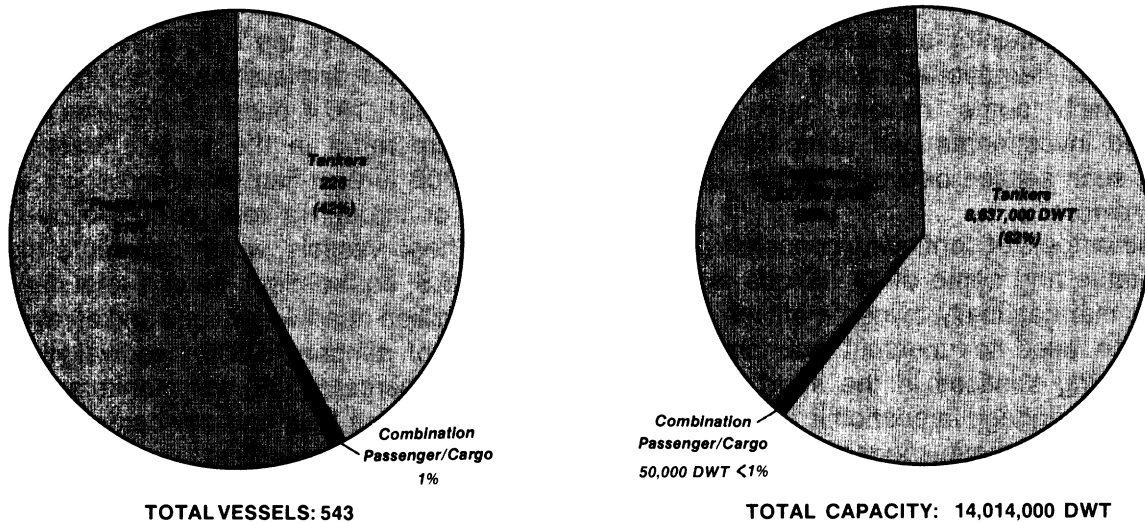
shows the comparative size of tankers presently in service in the world fleet. Figure XV.3

shows comparative profile views of various merchant vessels.

**Table XV.2**  
**U.S.-Flag Oceangoing Merchant Fleet as of April 30, 1976<sup>1</sup>**  
 (Tonnage in thousands of deadweight tons)

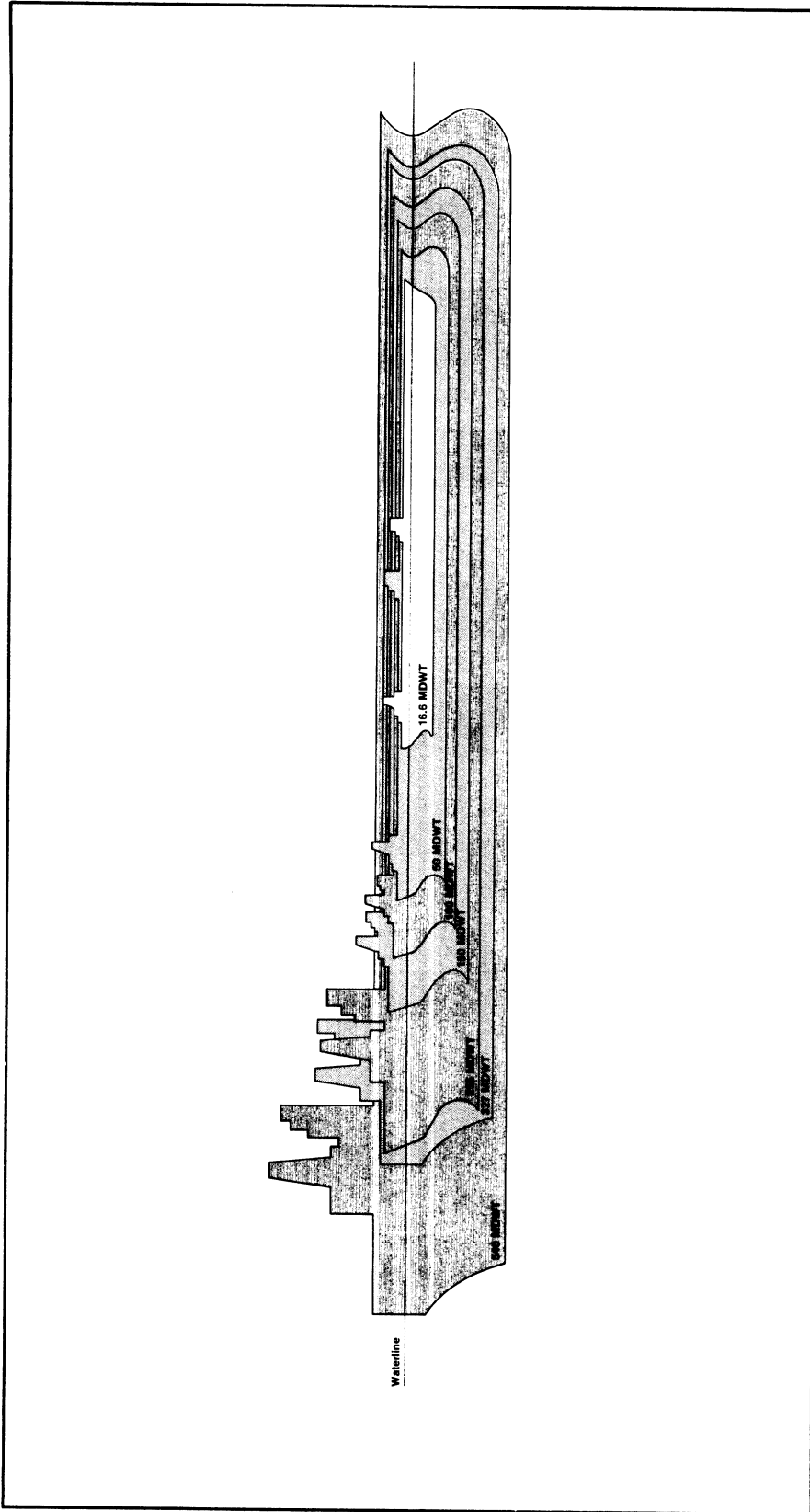
	Totals		Combination Passenger/Cargo		Freighters		Tankers	
	Private	USMA <sup>2</sup>	Private	USMA	Private	USMA	Private	USMA
Active	531	12	6	0	299	11	266	1
Total	543		6		310		227	
Tonnage	13,906	108	50	0	5,223	104	8,633	4
Total	14,014		50		5,327		8,637	
Inactive	44	257	0	53	22	191	22	13
Total	301		53		213		35	
Tonnage	1,215	2,458	0	334	261	1,940	954	184
Total	3,673		334		2,201		1,138	
TOTAL	575	269	6	53	321	202	248	14
Total	844		59		523		262	
Tonnage	15,121	2,566	50	344	5,484	2,044	9,587	183
Total	17,687		384		7,528		9,775	

<sup>1</sup>Excludes vessels operating exclusively on the inland waterways, Great Lakes, and those owned by the U.S. Army and U.S. Navy, and special types such as cable ships, tugs, etc. <sup>2</sup>Owned by the U.S. Maritime Administration.



AVERAGE CAPACITY: TANKER: 28,038 DWT  
 FREIGHTER: 17,184 DWT  
 COMBINATION PASSENGER/CARGO: 8,333 DWT

**Figure XV.1. U.S.-Flag Active Oceangoing Fleet.**



**Figure XV.2. Comparative Scale Drawing of Selected Tankers.**  
(From T-2 to 540,000-tonner)

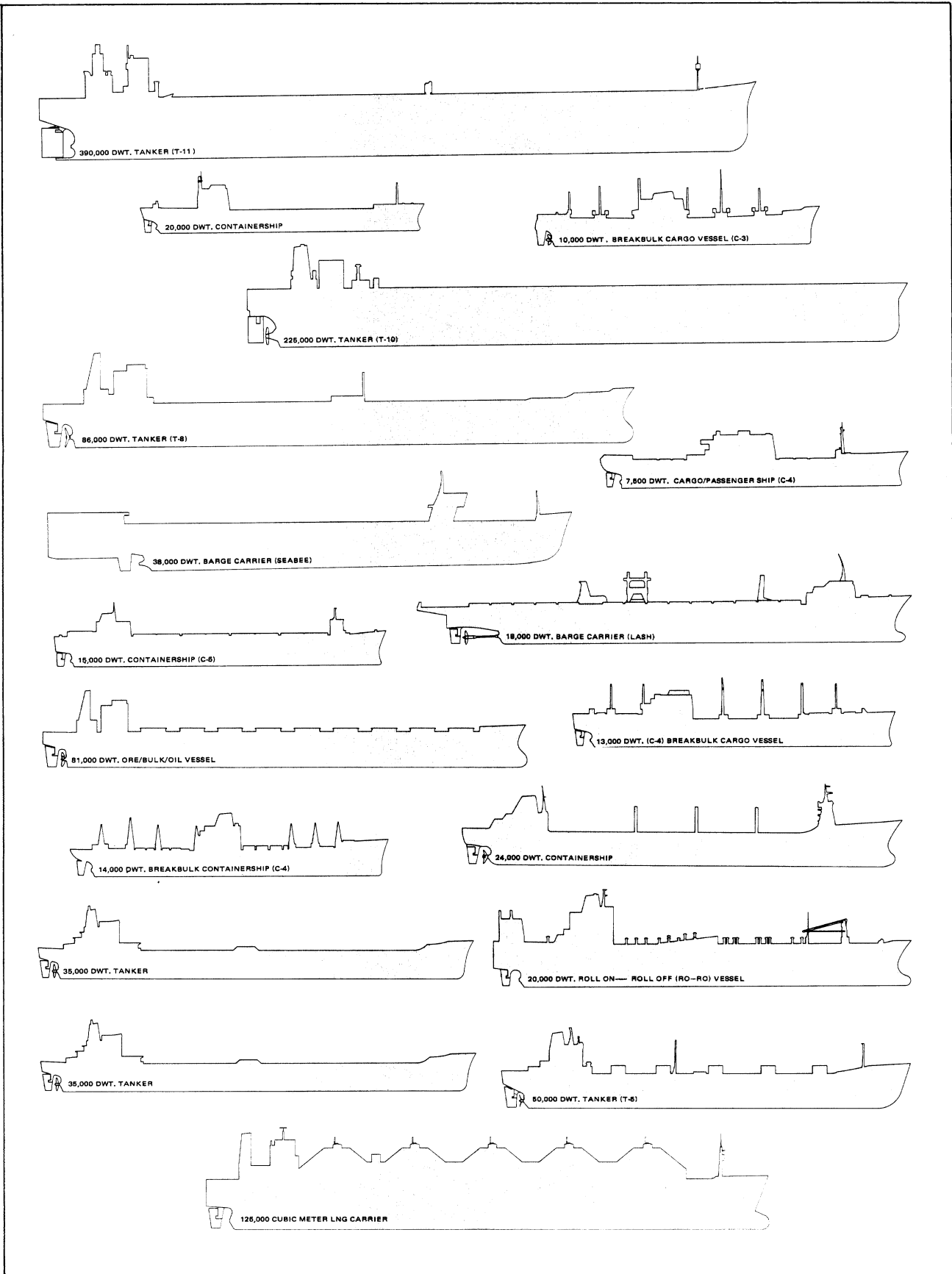


Figure XV.3. Merchant Vessel Profiles.



The vast majority of marine vehicles in the year 2000 will probably be similar in size and configuration to those existing today due to the relatively long economic life of these vessels. The makeup of the American merchant fleet will be influenced by the growth and composition of U.S. foreign trade as well as by technological developments. Innovative designs are expected to become increasingly significant in meeting specific commercial, ecological, military, and resource needs.

*Bulk Carriers.* This category includes vessels characterized by large cargo lot size, relatively low cargo value, and relatively slow speeds. The average tanker on order increased 800 percent in size between 1950 and 1975. This trend is expected to continue at a reduced rate with the average tanker on order expected to be about 230,000 DWT by the year 2000. This average will be composed of two size classes: 60,000–70,000 DWT feeder vessels with drafts under 40 feet and 350,000–400,000 DWT vessels for long ocean voyages. The maximum tanker size may reach 1.6 million deadweight tons if certain structural problems can be solved. Since major oil reserves are located in Arctic areas, large nuclear icebreaking or submarine tankers may also be developed.

Cryogenic liquids require specialized vessels which are expected to grow significantly in size. Currently, 125,000-cubic-meter, liquefied-natural-gas (LNG) carriers are common and ships with three times this capacity could be commonplace in 25 years. As this technology develops, other commodities, now carried in pressure vessels, will become candidates for low-temperature containment.

Dry-bulk carriers now are 10 times bigger than they were in 1950. While available port facilities may limit future growth, dry-bulk carriers on order are expected to average 125,000 DWT in the year 2000, about double the current size. Because the development of shoreside loading and discharge gear has not kept pace with growth in vessel size, increased use of self-unloading ships and slurry processes is expected.

Since large-bulk carriers have deep drafts and thus have limited use, increasing attention is expected to be placed on developing wider ships which will draw less water but carry as much cargo. This would offer the substantial

economic advantages of large ships without the expense of superports or extensive dredging of current harbors.

*Specialized Carriers.* This category includes carriers of low- to medium-value cargoes which traditionally move in medium-lot sizes at slow to medium speeds. Examples of such cargoes include sugar, lumber, refrigerated foods, scrap iron, pulp, and automobiles. Flexible schedules are required with rates generally below those of traditional liner cargoes. Since these cargoes are expected to grow significantly in foreign commerce, the use of specialized vessels also will increase. Such vessels offer considerable economic advantages, since handling gear can be designed for a single purpose and special preparation and packing of the cargo can be greatly reduced.

*General Cargo Carriers.* This category includes cargoes of differing value, from traditional breakbulk items such as bagged fertilizer and animal feeds to high-valued manufactured goods. However, the characteristics of this category could narrow as some of the low-valued commodities increase enough to warrant specialized vessels and some higher valued commodities become part of the express cargo market. As a shipping service, general cargo requires closely maintained schedules, medium to high speeds, and ports with well-developed rail and highway connections.

The handling of these cargoes accounts for 40 to 60 percent of operating costs in breakbulk shipping. This explains the effort to develop new system designs such as containerization, barge-carrying ships, roll-on/roll-off ships, pallet and highway trailer carriers. For example, the handling of general cargoes in containers has made the annual productive capacity of general cargo vessels 10 times greater than that of the World War II breakbulk freighters. Counting only longshore labor and not the time to strip and stuff the container, containerization has increased the labor productivity of loading/unloading vessels one hundredfold in the last 25 years.

Container ships have increased in speed from 15 knots in 1955 to 33 knots with today's Sealand SL-7 class. This required major increases in shaft horsepower (shp). If an increase to 37 knots were desired, the SL-7 hull form would require an increase to 200,000 shp

from the current 120,000 shp. Thus, significantly greater speeds with conventional displacement hulls cannot reasonably be expected as fuel cost becomes prohibitive. Such high-cost vessels will tend to operate between a limited number of high-volume ports with feeder vessels used to provide service to smaller ports.

Barge-carrying vessels are expected to continue to grow in acceptance and could capture more of the lower value end of the general cargo spectrum. Large trailer ships connecting ports on the U.S. mainland with Puerto Rico, Hawaii, and Alaska may capture an increasing share of trade with developing countries where port congestion is a problem and where wheeled vehicles are in demand.

*Emerging Competition.* High-speed express shipment in foreign commerce is developing rapidly and is expected to be 10 times greater by the year 2000. Cargo is typically high value (high inventory cost), and it moves in small lot sizes; examples include electronic gear, scientific instruments, medicines, computers, and watches. Express ocean shipping services come close to competing directly with air freight, but air freight currently is increasing its share of the market dramatically. Unless a revolutionary change occurs, recent trends indicate that air freight will carry a significant portion of the value, but not weight, of all U.S. overseas foreign commerce by the year 2000.

The potential for marine transportation to compete in this category of shipping depends on the continued development of high-speed unitized displacement ships for lower valued cargo and the development of large surface effect vessels with speeds of 100 knots or more to carry more valuable goods.

*Supporting Technology.* Ships today represent huge capital investments when compared with World War II vessels and this trend is expected to continue. Thus, it is important to utilize them in the most efficient manner to insure a fair return on these investments. New technology offers a high return on investment. Automation techniques can reduce voyage time, streamline cargo operations, and improve propulsion efficiency so that well-outfitted vessels can operate at their full profit potential.

Automated control systems for navigation can reduce the average number of miles traveled and fuel consumption. Maintenance and repair can be markedly reduced through the use of monitoring systems that provide better information on the condition of machinery. Mechanized and automated cargo-handling operations have already reduced ship turnaround time significantly.

Interest in computer-based technology extends beyond the sea operation to port and shore areas. The Maritime Administration is working with American operators to utilize computer science to improve shore productivity and cargo control. It also is seeking to reduce costs involved in the physical distribution process ashore, as well as to provide the means for efficient fleet management.

*Makeup of the Future Fleet.* Harbor and harbor entrance depths, the Continental Shelf, other dimensions, and port facilities will continue to have a major influence on ship sizes. Larger U.S. specialized ships and tankers will be built so as not to exceed these limits. An April 1976 Maritime Administration study to assess future deck and engineering officer requirements assumed that vessel sizes of new U.S. ships would be as listed in table XV.3.

**Table XV.3**  
**Size and Speed of U.S. Vessels**

Vessel Type	DWT	Speed
Container	22,500	22.5
Barge carrier (LASH)	40,000	22
Roll-on/Roll-off (Ro-Ro)	18,000	23
Neobulk	15,000	15
Heavy lift	5,000	11.5
Dry bulk	30,000	16
Tanker: Domestic	53,000	15.5
Alaska	118,000	15.5
Virgin Islands	35,000	15.5
Liquefied natural gas (LNG)	125,000 – 165,000 m <sup>3</sup>	17

Source: U.S. Maritime Administration.

Table XV.4 lists the Maritime Administration's estimate of the privately owned U.S.-flag fleet through 1985. Significant changes include the introduction of liquefied-natural-gas (LNG) vessels, a decline in the tanker fleet and break-bulk ships, and an increase in container ships and other specialized vessels.

**Table XV.4**  
**Projections of U.S. Oceangoing Fleet**

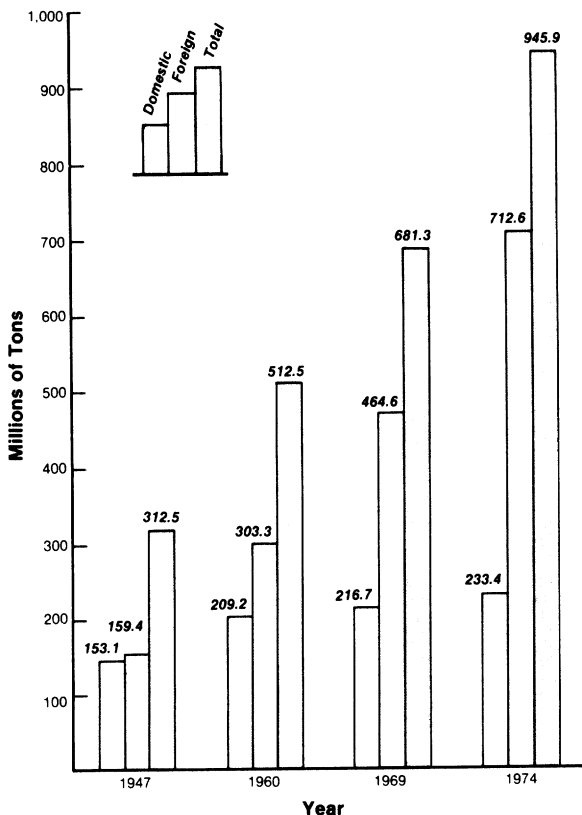
Type Vessel	1975 (Actual)	1980	1985
Breakbulk	134	127	101
Containership	109	106	133
Part Container	21	21	16
Combination pass/cargo	6	4	4
Barge carrier	23	27	41
Roll-on/Roll-off (Ro-Ro)	13	24	39
Neobulk	0	0	6
Heavy lift	0	1	4
Dry bulk	17	6	21
Tanker	234	204	177
Specialized tanker	18	12	20
Liquified natural gas (LNG)	0	24	36
Total	575	556	598

Source: U.S. Maritime Administration.

## FOREIGN TRADE

### Today

Since World War II, foreign trade through coastal ports has been increasing at a greater rate than domestic trade. Figure XV.4 shows the dramatic change in ratio and total tonnage for selected years through 1974.



Source: U.S. Army Corps of Engineers, Waterborne Commerce of the United States, 1974.

**Figure XV.4. Comparison of Foreign Trade Through Coastal Ports and Domestic Coastal Trade: Selected Years.**

American-flag ships are currently carrying about 5 to 7 percent of the total U.S. waterborne foreign trade tonnage which accounts for approximately 18 percent of the total value of this trade. American-flag participation is low in the bulk trade since many U.S. parent companies use tankers and other bulk and ore carriers registered under foreign flags.

In the container trade, however, almost 47 percent of the containers (42 percent of the tonnage carried in containers) in U.S. foreign trade were carried by U.S. vessels in 1974. Table XV.5 shows containerized cargo statistics for the period 1971 through 1974.

**Table XV.5**  
**Foreign Trade Containerized Cargo Statistics**

Year	Number of Containers Shipped (Thousands)			Commercial Tonnage in Containers (Thousands of long tons)		
	Foreign Flag	U.S. Flag	U.S. %	Foreign Flag	U.S. Flag	U.S. %
1971	393	456	53.7	4,984	3,478	41.1
1972	570	520	47.7	7,620	4,407	36.6
1973	778	620	44.3	10,745	6,484	37.6
1974 <sup>1</sup>	876	775	46.9	12,303	8,820	41.7

<sup>1</sup>Preliminary.

Source: U.S. Maritime Administration.

Total international waterborne trade in 1974 was 764.1 million short-tons of which 65 percent were imports (497.3 million tons) and 35 percent were exports (266.8 million tons). Table XV.6 shows the principal commodities carried in this trade. Thirteen commodity groups, each of which exceeded 10 million tons in 1974, account for over 75 percent of U.S. international freight trade and over 81 percent of the imports. The leading two commodity groups, crude petroleum and residual fuel oil, make up almost 60 percent of total imports and 40 percent of total foreign trade. Coal, lignite, corn, wheat, and soybeans account for over 51 percent of the total exports and about 18 percent of total foreign trade.

### Future Foreign Trade

Total United States waterborne foreign trade has been estimated by the Maritime Administration to be 697 million short-tons in 1975 and 1,293 million tons in 1990. These preliminary projections represent an annual growth rate of approximately 4.2 percent over the 15-year period (see table XV.7). Imports are expected

**Table XV.6**  
**Foreign Waterborne Commerce, 1974**  
(Thousands of short tons, totals rounded)

Commodity Group	Total Imports and Exports			
	Tons	Cumulative Percentage	Imports (tons)	Exports (tons)
Crude Petroleum	216,123	28.3	215,994	130
Residual Fuel Oil	82,089	39.0	81,286	813
Coal and Lignite	63,684	47.4	2,102	61,582
Iron Ore and Concentrates	53,354	54.3	50,859	2,495
Corn	32,076	58.5	27	32,049
Wheat	27,505	62.1	57	27,448
Aluminum Ores, Concentrates	18,910	64.6	18,908	2
Coke, Petroleum Asphalt, Solvents	17,157	66.9	7,843	9,313
Basic Chemicals and Products NEC	15,842	68.9	7,096	8,747
Soybeans	15,170	70.9	--	15,170
Phosphate Rock	12,572	72.6	178	12,395
Distillate Fuel Oil	12,185	74.2	12,082	103
Limestone	10,240	75.5	7,694	2,546
Total of Leading 13 Commodity Groups	576,917	75.5	404,126	172,793
All Others	187,172	100.0	93,157	94,013
Total Foreign Waterborne Commerce	764,089	100	497,283	266,806

Source: U.S. Army Corps of Engineers, Waterborne Commerce, 1974.

to grow at 4.45 percent from 428 to 822 million tons and will make up a larger share of foreign trade in 1990 than in 1975. Exports will grow at a slower rate, 3.82 percent from 269 to 471 million tons. Total foreign trade will continue to increase at a higher rate than domestic waterborne commerce through 1990.

**Table XV.7**  
**Projected U.S. Waterborne Foreign Trade**  
(Millions of short tons)

Trade	1975	1990	Annual Growth Rate (Percent)
Imports	428	822	4.45
Exports	269	471	3.82
Total	697	1,293	4.25

Source: Bureau of Census preliminary data, Monthly Report FT-985-75 series, and U.S. Maritime Administration.

Foreign countries contributing significantly to our waterborne foreign trade have been grouped into 19 trade regions. These regions account for 642 million tons or 92 percent of the total foreign trade in 1975. Tonnage is expected to increase to 1,049 million tons by 1990 with the share of foreign trade to these regions declining to 81 percent of the total. Tables XV.8 and XV.9 show the rank order of the principal trade routes by imports and exports for 1975 and 1990.

**Table XV.8**  
**U.S. Waterborne Foreign Trade — Imports,**  
**1975 and 1990**  
(Millions of short tons<sup>1</sup>)

Trade Region	1975	1990
19 Principal Trade Routes in Rank Order of Imports:		
Eastern South America	116.80	165.30
Caribbean	62.80	92.10
Middle East	44.60	65.10
Canada	43.00	86.80
Developing Africa	21.30	32.30
East Asia	19.60	36.50
Northern Europe	17.20	46.50
Northern Africa	17.00	25.40
Japan	11.70	35.00
Mediterranean Europe	9.20	17.90
Mexico	9.00	15.60
Western South America	7.30	12.10
Oceania	4.30	10.90
United Kingdom	3.90	11.20
Central America	3.50	6.40
Communist Europe	1.50	2.80
Republic of South Africa	1.10	2.30
South Asia	1.0	2.60
Communist Asia	0.01	0.03
Total	394.80	666.90
All Other Trade Regions	32.90	155.90
Total Imports	427.70	821.80

<sup>1</sup>Figures and totals rounded.

**Table XV.9**  
**U.S. Waterborne Foreign Trade — Exports,**  
**1975 and 1990**  
(Millions of short tons<sup>1</sup>)

Trade Region	1975	1990
19 Principal Trade Routes in Rank Order of Exports:		
Japan	70.70	107.40
Northern Europe	47.20	74.80
Canada	31.30	43.80
Mediterranean Europe	23.60	37.10
East Asia	13.90	22.10
Eastern South America	12.30	18.80
South Asia	9.50	15.40
Communist Europe	8.00	13.80
United Kingdom	7.80	12.40
Middle East	4.50	7.30
Caribbean	4.10	6.30
Western South America	2.80	4.40
Oceania	2.30	3.50
Mexico	2.10	3.20
Central America	1.90	2.90
Developing Africa	1.90	2.90
North Africa	1.80	3.00
Communist Asia	1.20	2.10
Republic of South Africa	0.80	1.10
Total	247.60	382.30
All Other Trade Regions	21.50	88.80
Total Exports	269.20	471.00

<sup>1</sup>Figures and totals rounded.

Regional tonnage movements reviewed from a type-of-service point of view are expected to follow past trends for at least the next 15 years. For example, the liner trades, which provide service on a regular scheduled basis, are expected to increase their tonnage from 64 million in 1975 to 115 million in 1990. The major share of this tonnage will be containerized cargo since the changeover for this relatively recent technological innovation will be substantially completed by 1990. Tanker service will increase from 185 to 266 million tons with the primary cargo being crude petroleum. The irregular or tramp trade is expected to grow from 393 to 667 million tons between 1975 and 1990 (see table XV.10).

**Table XV.10**  
**U.S. Waterborne Foreign Trade By Service Type:**  
**19 Principal Regions**  
 (Millions of short tons<sup>1</sup>)

Type			Annual Growth Rate (Percent)
	1975	1990	
Liner	64.4	115.3	3.9
Tanker	184.6	266.4	2.5
Irregular	393.3	667.4	3.6
Total	642.4	1,049.1	3.3

<sup>1</sup>Figures rounded.

Ton-mileage in international trade is expected to increase from approximately 4 trillion in 1975 to almost 6.5 trillion in 1990.

Projecting foreign trade is significantly different and more complicated than projecting domestic trade since almost the entire world must be considered with respect to its relationship with the United States.

Crude petroleum, by far the largest import today, is expected to continue as the major import in 1990. A great number of factors could, however, radically alter projected figures. The attainment of the goals of Project Independence could significantly reduce the need for oil imports; future embargoes by the oil cartels could totally cut off imports from various trade regions. Exports of grains and mill products could be altered radically by such diverse factors as climatological phenomena (droughts or floods) and political relationships, particularly with communist countries.

