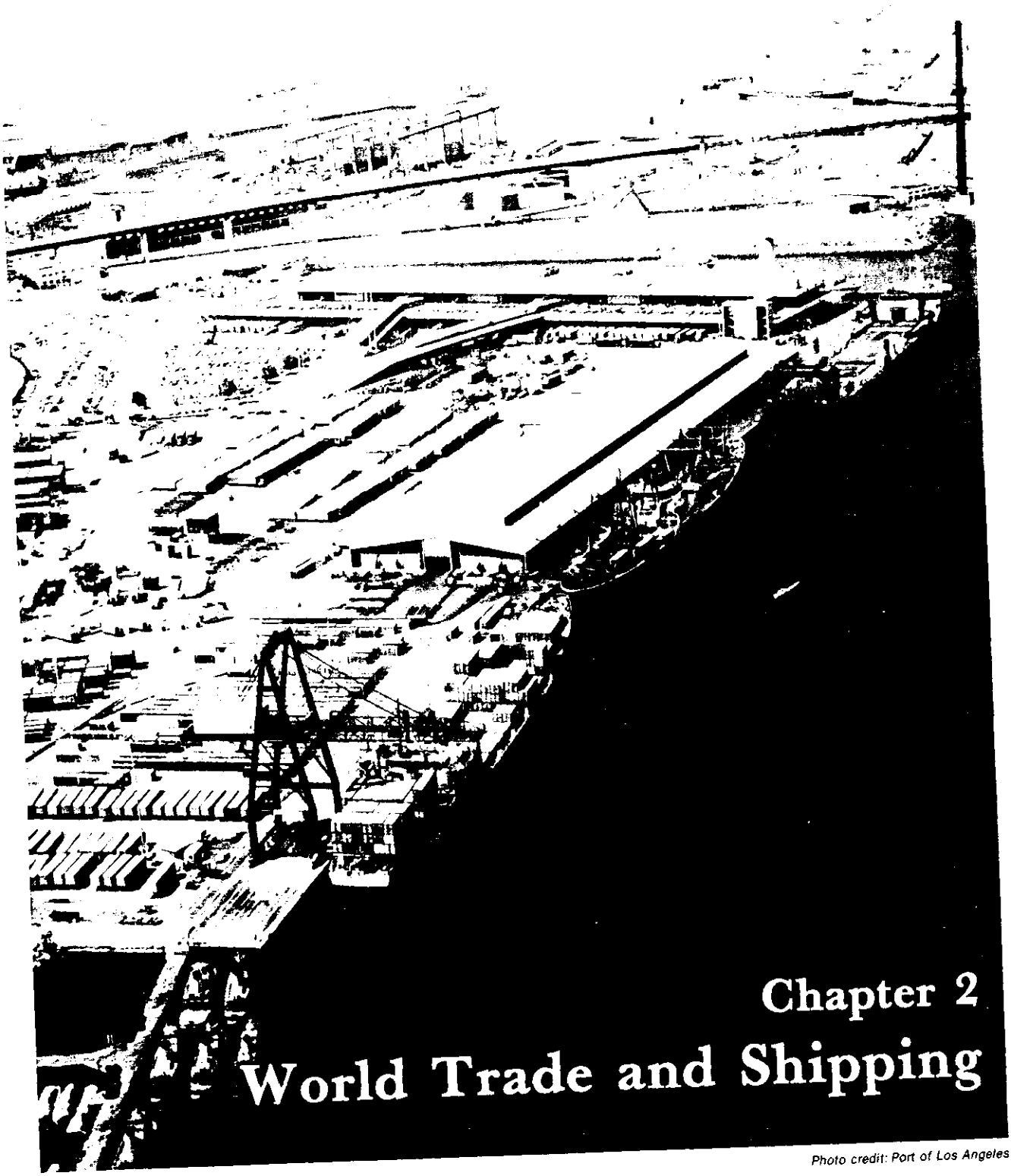

Chapter 2
World Trade and Shipping

Photo credit: Port of Los Angeles

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Chapter 2
World Trade and Shipping

OVERVIEW

Almost all international trade in goods is transported by sea. Ocean shipping plays a central and essential role in the world economy and in world trade. Therefore, it is vital to understand the factors affecting trade and shipping growth or decline in order to develop effective policies influencing U.S. participation in world trade or in the transportation industry that serves the trade. This chapter describes the status and trends in world seaborne trade and the international shipping and shipbuilding industries. It will present an outlook for the future for each and note problems and uncertainties.

In recent years, international trade has become a dominant factor in economic growth for most industrialized countries. Many newly industrialized countries have become so through major trade growth. For this reason, OTA commissioned Wharton Econometrics, Inc., to prepare a world trade outlook to the year 2000, utilizing a world economic model to make projections of future maritime trading patterns. The results and implications of that trade outlook are presented in this chapter.

While that outlook is based on a series of economic assumptions with ‘ ‘no major surprises, it is clear that the most radical changes in the past have occurred because of unpredicted events such as wars, oil price ‘‘shocks, the Suez Canal closing in 1967, and numerous politically motivated actions. Less radical, but important, changes likewise have been caused by unpredicted technological innovations, economic pressures, and more gradual political forces. This chapter, therefore, will present an overview of which important forces are acting today to influence maritime trade and shipping, how the world maritime community is reacting to these influences, and what future trends now appear to be most significant.

Maritime Trade Patterns

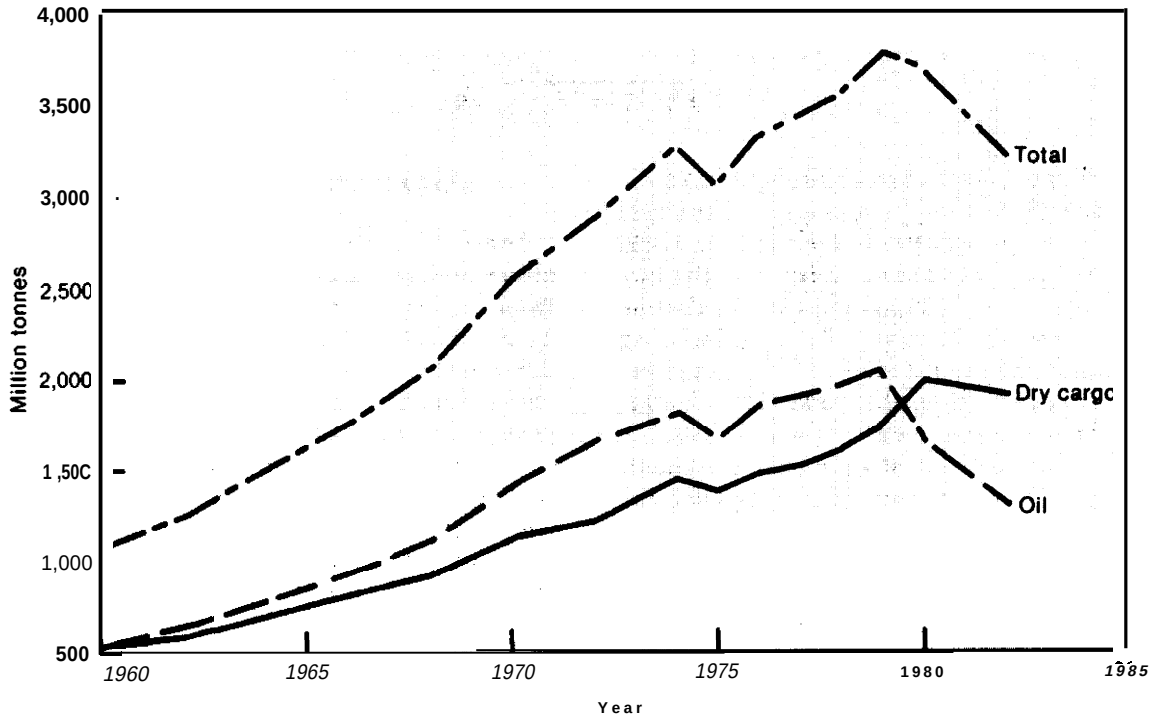
Maritime trade in goods worldwide totaled 3.21 billion metric tons (tonnes) in 1982. This is down from the high of 3.77 billion tonnes in 1979 (fig. 1). As shown in figure 2 (for 1980), petroleum is the dominant single commodity and accounts for almost one-half of the total world tonnage transported. The dry-bulk commodities traded likewise are dominated by a few major groups: iron ore, coal, and grain. These and other bulk goods traded total another one-fourth of world tonnage. The remaining quarter, referred to as general cargo, includes a great diversity of manufactured goods and consumer products.

The differences in requirements of the trades have led to establishing two principal modes of world shipping—the liner mode, which provides the general cargo trade with regular, scheduled service including container carrying ships; and the bulk mode, which employs a variety of ships on a time- or voyage-charter (rental) basis serving both the liquid- and dry-bulk trades. The liner trades involve by far the largest portion of world trade when measured by dollar value, while the bulk trades account for the largest portion of volume or tonnage.

Figures 3, 4, 5, and 6 provide examples of trading networks that have developed for petroleum and dry-bulk commodities. They illustrate both the major trade routes and the relative tonnages carried on each. If one were to expand these pictures to cover the huge variety of other products and goods transported worldwide, the lines would fill the map solidly. The United States is involved in almost every aspect of this trading network.

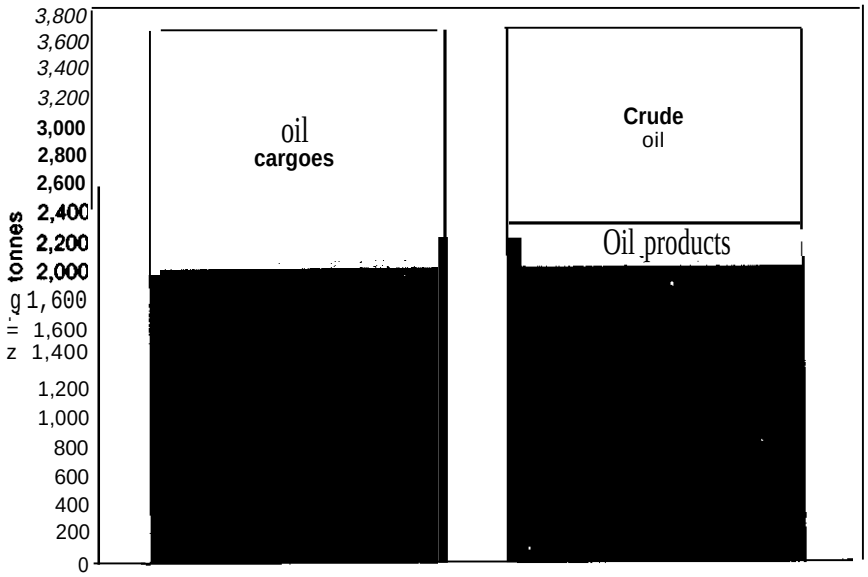
The United States is a major trading nation, with international markets increasingly important to **U.S.** industry. During the 1970’s the value of U.S.

Figure I.–World Seaborne Trade–1960=82



SOURCE: OECD & Fearnleys, 1982.

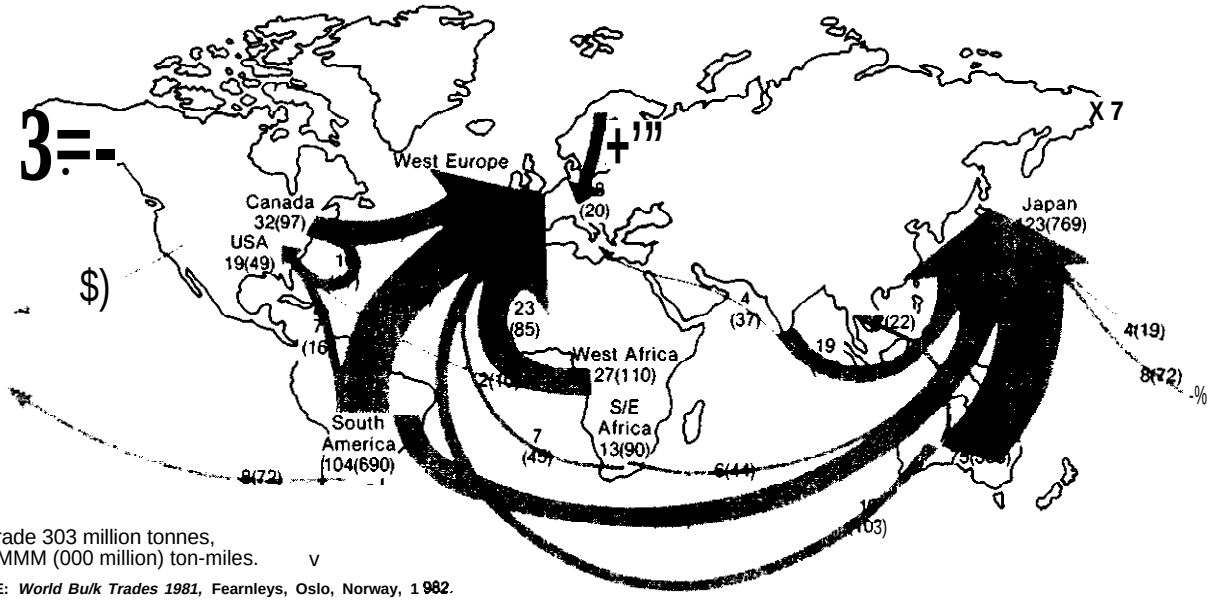
Figure 2.—Principai Commodities in Worid Seaborne Trade—1980



SOURCE: Fearnleys Review, 1982.

Figure 3.— Iron Ore: Seaborne Trade-1981

Main inter-area movements in million tonnes. (MMM ton-miles in brackets.) Only main routes are shown. Area figures are totals including smaller routes not shown separately.

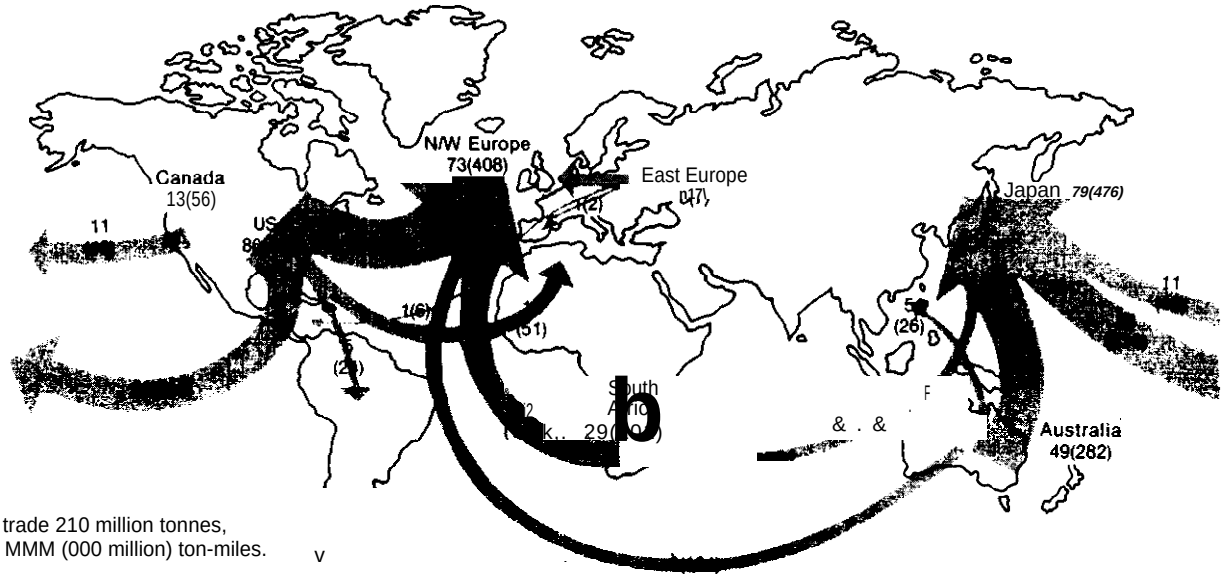


Total trade 303 million tonnes,
1,508 MMM (000 million) ton-miles.

SOURCE: ***World Bulk Trades 1981,*** **Fearnleys, Oslo, Norway, 1982.**

Figure 4.— Coal: Seaborne Trade–1981

Main inter-area movements in million tonnes. (MMM ton-miles in brackets.) Only main routes are shown. Area figures are totals including smaller routes not shown separately.

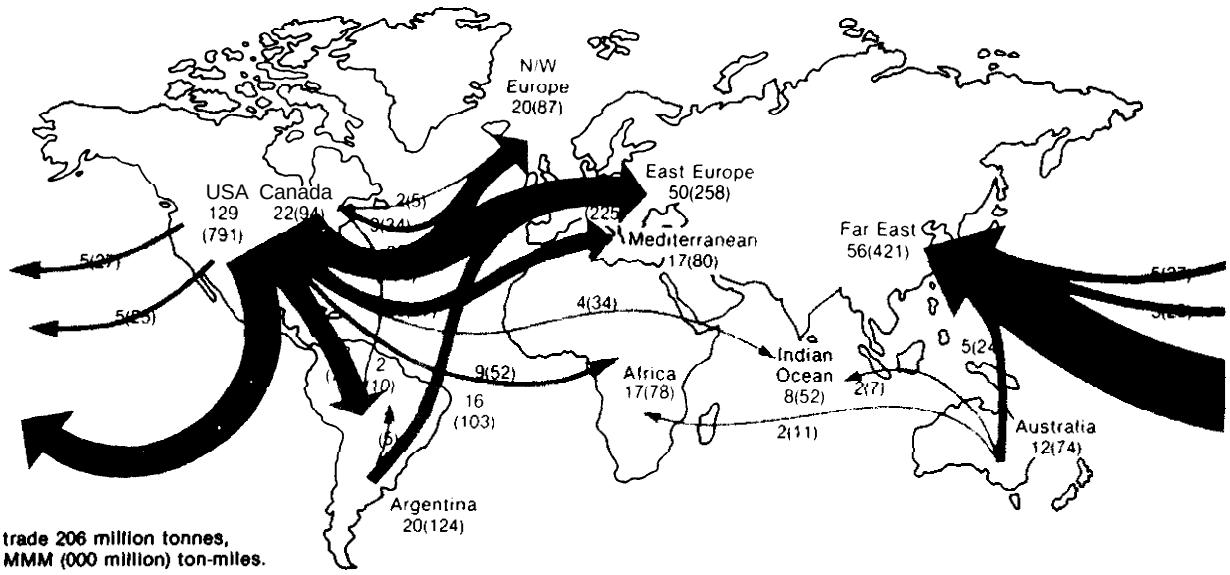


Total trade 210 million tonnes,
1,120 MMM (000 million) ton-miles.

SOURCE: World ***Bulk Trades 19S1,*** **Fearnleys, Oslo, Norway, 1982.**

Figure 5.- Grain: Seaborne Trade—1981

Main inter-area movements in million tonnes. (MMM ton-miles in brackets.) Only main routes are shown. Area figures are totals including smaller routes not shown separately.

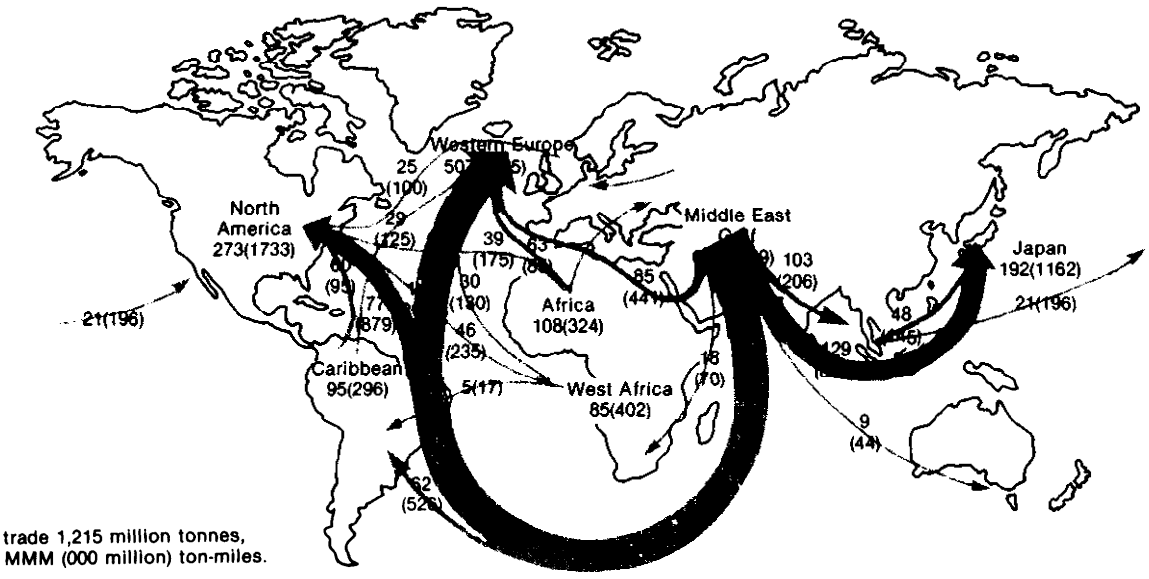


Total trade 206 million tonnes, 1,131 MMM (000 million) ton-miles.

SOURCE: Wortd *Bulk Trades KXN,* Feamleys, Oslo, Norway, 1982.

Figure 6.— Crude Oii: Seaborne Trade–1981

Main inter-area movements in million tonnes. (MMM ton-miies in brackets.) Oniy main routes are shown. Area figures are totals including smaller routes not shown separately.



Total trade 1,215 million tonnes, 7,371 MMM (000 million) ton-miles.

SOURCE: *World Bulk Trades 1981,* Fearnleys, Oslo, Norway, 1982.

international trade rose by a factor of 2.5. The United States engages in trade of $1 billion or more each year with each of 58 other countries in North and South America, Europe, the Near East, Southern and Eastern Asia, Oceania and Africa. The following illustrates some of the major commodities that are imported to and exported from the United States. [1]

In 1982, U.S. exports totaled $212.2 billion, with less developed countries (LDCS) receiving $82.6 billion, Western Europe $60.0 billion, and Canada $33.7 billion. U.S. imports reached $244.0 billion, with the greatest share from the LDCS ($99.0 billion), followed by Western Europe ($52.3 billion), Canada ($46.5 billion), and Japan ($37.7 billion).

In terms of volumes of trade, the United States is a major exporter of dry-bulk commodities. In 1980 the United States exported 97.2 million tonnes of grain, 72.8 million tonnes of coal, 28.8 million tonnes of soybeans/meal, and 27.6 million tonnes of forest products. On the import side, the biggest U.S. import was petroleum, 318 million tonnes in 1980.

The single most important export sector was capital goods. Out of total exports of $212.2 billion in 1982, capital goods accounted for $75.2 billion. Nonelectrical machinery and parts made up $47.8 billion of this. Industrial supplies accounted for $61.7 billion, food and beverage for $31.3 billion, and consumer goods for $27.5 billion.

U.S. imports in 1982 were valued at $244 billion, with fuels ($66. 4 billion) and consumer goods ($67.7 billion) virtually equal as the leading commodities. Of the fuels, petroleum accounted for almost all of the total, at $60.8 billion. Passenger cars—$20.2 billion—were the most important single consumer good. "Other" industrial supplies amounted to $45.7 billion, and capital goods were valued at $40.6 billion (of which about half was nonelectrical machinery and parts). Food and beverages totaled $17.1 billion.

[1] Data compiled from the Draft Analytical and Statistical Supplement to the Statement of Lionel H. Olmer before the Joint Economic Committee, prepared by the International Trade Administration, U.S. Department of Commerce, Feb. 3, 1983.

Linkage of Economic Activity, Trade, and Shipping

Many comparisons have been made of trade and economic activity. The linkages are important if not always clear and consistent. Figure 7 traces the growth rates since 1970 of both world seaborne trade in dry cargo and total industrial output of the countries belonging to the Organisation for Economic Cooperation and Development (OECD). This indicates that if one leaves out petroleum, shipping closely follows economic activity in industrialized countries. For total trade including petroleum, however, the picture is more complex. Between 1965 and 1973, when the gross national product (GNP) of OECD countries rose by 4.6 percent annually, and that of the world rose by 5 percent, total demand for shipping grew more rapidly at 8.4 percent per year. On the other hand, when between 1973 and 1980 OECD GNP rose annually only by 2.3 percent and that of the world by only 2.6 percent, demand for shipping only increased by 2.2 percent. [2] Trends in the global economy and international trade are clearly related to and can promote or inhibit international shipping activity.

The importance of international trade for the U.S. economy has grown progressively since World War II. Although the U.S. ratio of exports to GNP still is below that of other industrial countries, [3] it stood in 1980 at 8.5 percent, up from 4.4 percent in 1970. Imports also doubled between 1970 and 1980, going from 4.1 percent to 9.5 percent of GNP.

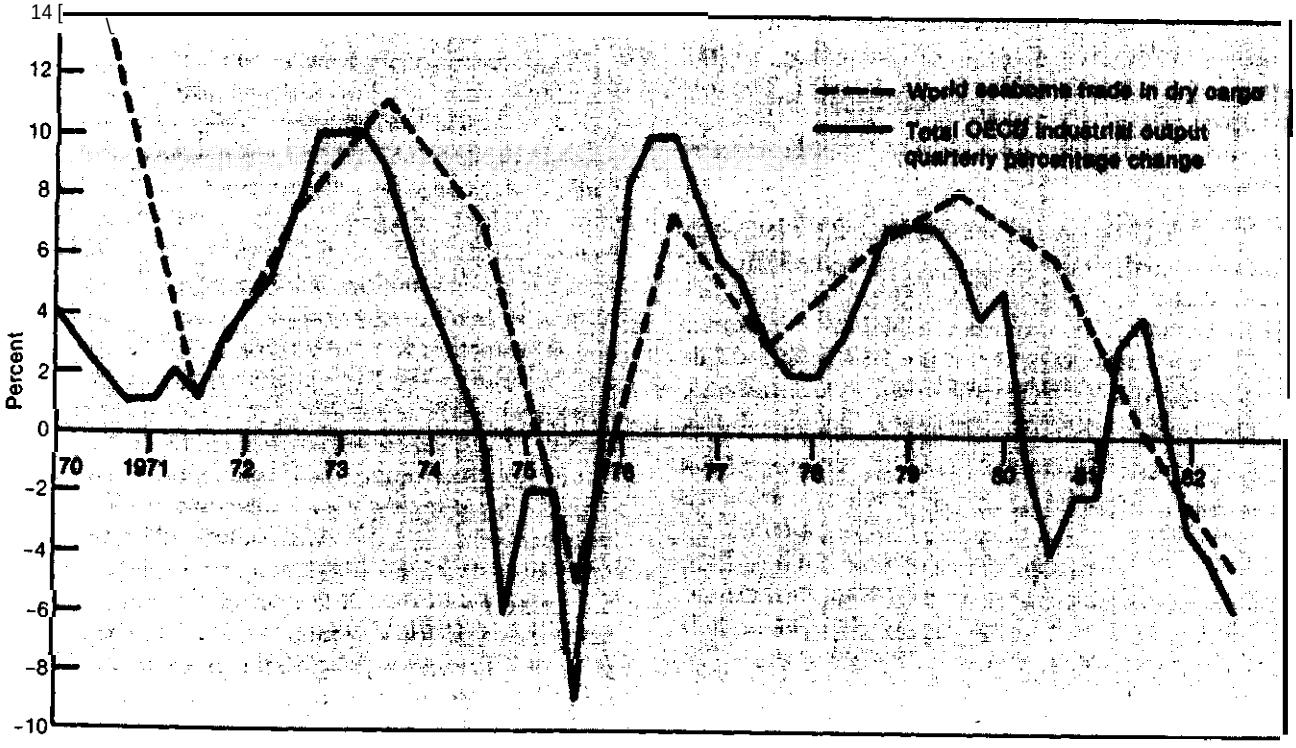
The increased interdependence of the U.S. economy with the international economy is reflected graphically in some of the data contained in the latest *Annual Report of the President on the Trade Agreements Program*. [4] For example, the United States Trade Representative (USTR), which authored the report, estimates that over 5 million workers are dependent on foreign trade for their livelihood, and that 80 percent of all new manufac-

[2] *Maritime Transport, 1981: A Study by the Maritime Transport Committee* (Paris: Organisation for Economic Cooperation and Development, 1981).

[3] *Twenty-Sixth Annual Report of the President of the United States on the Trade Agreements Program, 1981-82* (Washington, D. C,: United States Trade Representative (USTR), 1983).

[4] Ibid.

Figure 7.-Total OECD Industrial Output in Percentage Quarterly Change Related to Percentage Yearly Change of World Seaborne Trade in Dry Cargo



SOURCE: OECD, Fearnleys.

turing jobs created in the late 1970's were linked to exports. In addition, 1 out of every 3 acres planted by American farmers produces crops for exports. This interdependence is expected to continue to grow, with some estimates putting U.S. exports as a percentage of GNP in 1990 at 15 percent.

For the industrialized countries of OECD as a whole, exports accounted for 16 percent of GNP in 1980, up from 9 percent in 1962, The developing countries, especially the newly industrializing countries,[5] also increased their participation in international trade in the last 10 years, with their share of the value of free world exports increasing from 20 to 30 percent between 1970 and 1980. South Korea, for example, increased its exports of goods and services from 3 percent of GNP in 1960 to 34 percent of GNP in 1977, while Taiwan went from 11 to 59 percent in the same period, [6]

Much of the economic growth in the postwar period has been the result of international trade. Recent studies have demonstrated that when the economies of OECD countries grow by more than 1.5 to 2 percent per year—the situation during the postwar period until recently —nonoil imports tended to grow three times as fast. The same studies show a similar negative relationship, with zero growth in OECD economic activity, resulting in a 5-percent drop in nonoil imports. [7]

The foregoing implies that economic prosperity over the long term can result from and lead to growth in world trade, and that a healthy future for world trade both depends on and contributes to the health of maritime transport. There also are negative aspects of trade growth such as the need to promote conservation of world resources, including ener~, over the next several decades—particularly into the next century. This study has not considered such problems except when they obvious-

[5] *The Impact of the Newly Industn'alizing Countries on Production and* trade in *Manufactures: Report by the Secretary General* (Paris: Organisation for Economic Cooperation and Development, 1979).

[6] USTR, op. cit., 1983.

[7] Fred Bergsten and William R. Cline, *Trade Policy in the 1980's* (Washington, D. C.: Institute for International Economics, 1983),

ly have affected economics (e. g., with fuel prices). However, it should be recognized that uncontrolled use of vital resources on a large scale will have practical or needed limits. World trade may reach some of these limits and adjustments may be neccessary, especially if economics does not bring about natural adjustments.

CURRENT STATUS OF AND TRENDS IN WORLD SHIPPING

Overview of the World Shipping Industry

World shipping follows the trade it serves, but because of its international and entrepreneurial nature, the industry tends to be even more volatile than trading patterns. The industry presently is experiencing a major excess of tonnage, but large fluctuations in supply and demand in shipping have been quite common for a long time.

The shipping industry consists of several diverse businesses and sectors. In total, it includes those companies that operate the world fleet of over 35,000 major, cargo-carrying ships—tankers, chemical and liquefied gas carriers, combination bulk and oil carriers, ore and dry-bulk ships, general cargo ships, container ships, and many even more specialized types such as automobile carriers and roll-on, roll-off (RO/RO) ships.

The principal sectors today are the tanker operators, the dry-bulk operators, and the liner operators. The tanker and dry-bulk-carrier operators are similar in that fleets of ships usually are owned and/or chartered to carry single, large-volume commodities (i. e., iron ore, grain, coal, crude oil, and petroleum products) over fixed, and sometimes, long periods of time. Shipping thus is closely related to a larger enterprise. Many independent operators participate under ‘ ‘time-charter’ or voyage-charter contracts; in other cases, major petroleum or other resource companies own and operate their own fleets.

The liner industry, or general cargo business, on the other hand, operates more like a railroad—carrying freight from port to port at fixed rates and on a regular schedule. The modern containerships and RO/RO ships are typical of the ships used in this trade within the industrialized world. The liner industry is characterized further by the predominance of conferences, international groups of carrier lines that collectively agree on routes, schedules, rates, and other aspects of liner services.

The composition of the world merchant fleet, as of January 1, 1982, is shown in figure 8. Viewed in the conventional shipping categories, there are roughly twice as many general cargo ships as bulk ships. Within the bulk fleet, nearly two-thirds of the ships arc devoted to carrying liquid (mostly petroleum) cargoes. However, the numbers of ships do not accurately reflect the magnitude of the various shipping sectors. As shown in figure 9, the general cargo ships represent a much smaller portion of the fleet when measured in gross tonnage. The general cargo tonnage is less than one-third of that in the combined bulk fleets. Tankers dominate the bulk fleet in gross tonnage as well as numbers.

While shipping always has been an international business, reflecting the nature of foreign trade, the international complexity of world shipping is increasing. Prior to the 1960’s, the relative magnitude of the shipping industries owned in various nations corresponded to the size of the fleets registered in each country. The significant fleets were found almost exclusively in the industrialized nations with the largest trading volumes.

In the 1960’s, some countries (Cyprus, Lebanon, Liberia, Panama, Singapore [to 1980], Oman, Bahamas [since 1976], and Honduras) developed fleets of ‘open registries’ or ‘ ‘flags of convenience’ that do not require owner citizenship. Tax advantages and, often, less strict vessel and crewing standards

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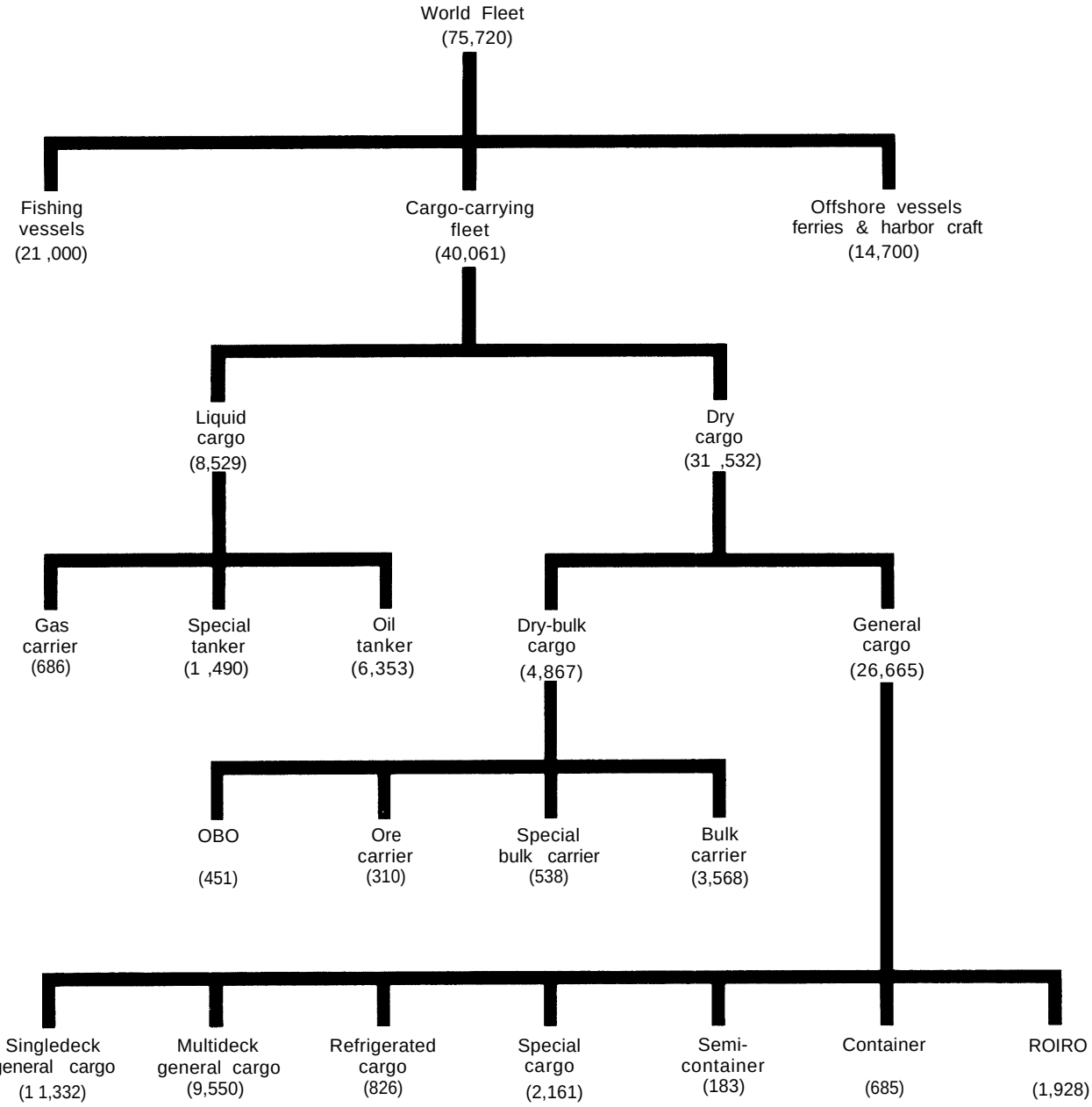
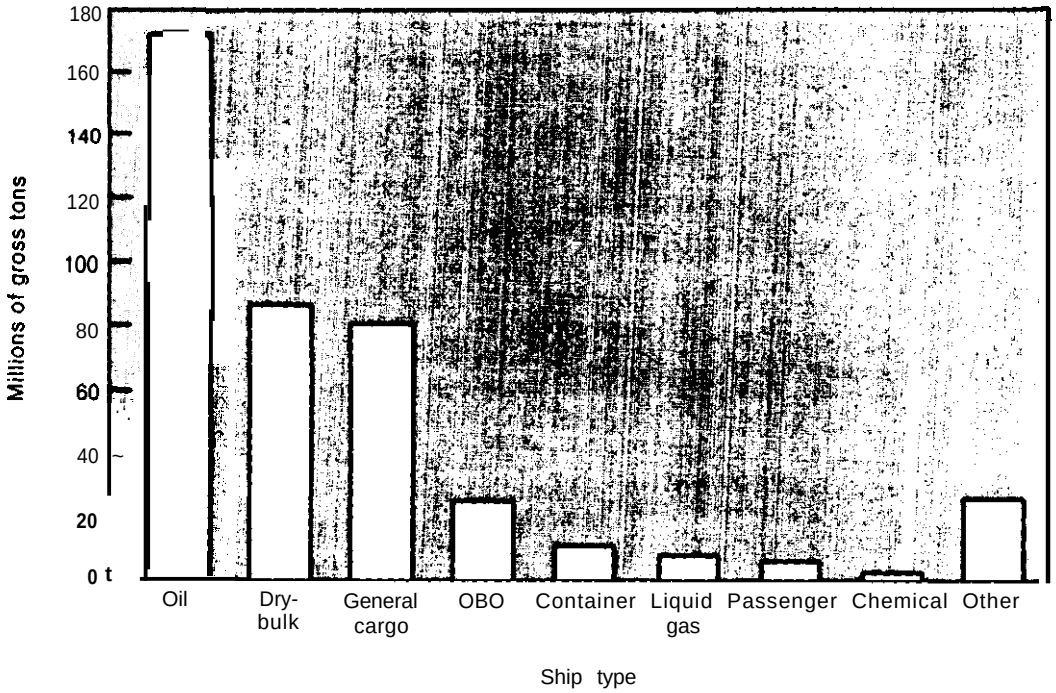
Figure 8.–Composition of the World Fleet (by number) -Jan. 1, 1982



SOURCE: A & P Appledore, 1982.

Figure 9.–Composition of Worid Fieet by Tonnage Juiy 1, 1981
Totai: 421 Miiiion GRT



SOURCE: Lloyd's Register of Shipping Statistical Tables 1981.

attracted ship registrations to these countries. Thus, while the United States had the largest registered fleet by tonnage 20 years ago, Liberia now has the largest fleet in the world (fig. 10),

The spectacular growth in the Liberian fleet (800 percent in 20 years) and other open registries is attributable primarily to business practices of U.S. and other companies of the industrialized world. Two-thirds of the world fleet is registered in eight countries, which are (in order of fleet size): Liberia, Japan, Greece, the United Kingdom, Panama, the U. S. S. R., Norway, and the United States. Fleets-of-open-registry countries accounted for 25 percent of the world fleet in mid-1981.

When the tonnage registered under flags of convenience is distributed among the countries of beneficial ownership* (see table 1), the United States, Hong Kong, Greece, and Japan total 75 percent—clear leaders in ownership of world shipping. Flags of convenience are far more widely used in bulk trades than in the general cargo industry. The Liberian fleet is the predominant world tanker fleet (now over one-half of all ship tonnage) that is, for the most part, owned by or chartered by the multinational petroleum companies.

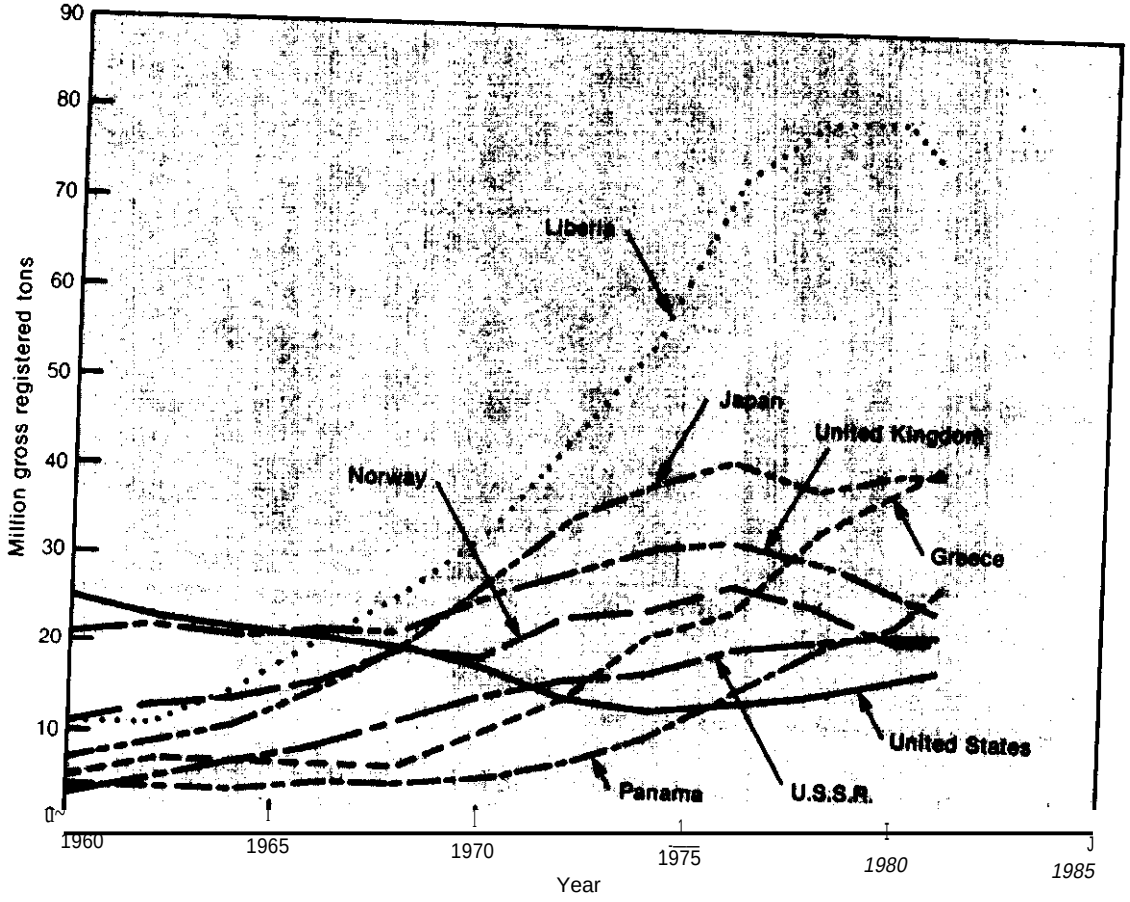
Liner ships have a greater diversity of trade route, flag, ownership, and design than the other segments of the industry. For example, containerships make up 3 percent of the world fleet by tonnage and the largest portion of this fleet is U. S.-flag, followed by the United Kingdom, Japan, and West Germany. Since these countries are also the predominant nations trading in manufactured goods, this fleet tends to match the trade in nationality.

Today, world shipping is in a major slump. Much of the tanker fleet (about one-third in 1982) is surplus to the need for transporting petroleum.[8] A substantial portion of the dry-bulk fleet also is surplus to demand, and the liner trades have not expanded at all in recent years. The oversupply of

*'Beneficially owned" is defined as designating the owner who receives the benefits or profits from the operation.

[8]Fearnley's, *Review* 1982, Oslo, Norway, 1983.

Figure 10.-Fleets of the Leading Maritime Nations, 1960-81



SOURCE: Lloyd's Register of Shipping Statistical Tables 19S1.

Tabie 1.–Beneficiai Ownership of the Open. Registry Fieets (reglstered Llbaria, Panama, Cyprus, Bermuda, and Bahamas)

Country of beneficial owners	Percent of total open-registfy fleet, by deadweight tonnage
United States	31
Hong Kong	22
Greece	12
Japan	10
West Germany	3
Norway	3
10 other European Countries plus Korea and Indonesia	1-2Y0 each
~othercountries	less than o.5%e ach

SOURCE: UNCTAD, 1961 Rev/ew of A@Wme Transpon, data supplied by A & P Appledore Ltd.

ships has caused substanti~ adjustments in the world fleet, with shi, scrapping (especially of large tankers) at an all-time high.

The diversit, in maritim, transportation makes it difficult to characterize the shipping industr, in other than very general terms and adds to the difficult, in developing effectiv, policies on which national governments can agree. In the following sections, trends in three major sectors of world shipping (liquid-bulk, dry-bulk, and general cargo) will be discussed separately.

[1]Statistics on the three shipping sectors were taken primaril, from *Maritime Transport 1981* (Paris: Organisation for Economic Cooperation and Development, 1982).

Liquid Bulk

Today, 94 percent of the gross registered tonnage (grt) in the liquid-bulk fleet is in oil tankers, Demand for transportation of oil peaked in 1977 at 10.5 trillion ton-miles. The current slump in this freight market has brought it to pre-1973 levels (under 8 trillion ton-miles) with the recent rate of decrease in ton-miles at 13 percent for 1980 and 12 percent for 1981. This rate of decline in the demand for oil tanker tonnage far exceeds the shrinkage in the oil tanker fleet.

In tonnage, tankers remain the single largest shipping sector, comprising 41 percent of the world merchant fleet. Fifty-four percent of the 172 million grt in oil tankers is registered in OECD countries, with another 31 percent registered in open-registry countries.

After annual growth rates of 12 to 16 percent in the mid-1970's, the tonnage in the oil tanker fleet has been stable or declining since 1977. From mid-1980 to mid-1981, it declined 1.9 percent (grt) (1.4 percent in deadweight tons (dwt)). The net decline in the tanker fleet in 1981 is comprised of an addition of 7.7 million dwt delivered and a reduction of 12.5 million dwt lost or scrapped. Most of the decline is accounted for in the larger tanker categories. Since 1980, the tonnage in ships under 150,000 dwt has been increasing, while that in ships over 150,000 dwt has been declining. Similarly, 10 million dwt were on order as of January 1, 1982 in the smaller category, with only 2 million dwt in the larger tankers. The largest amount of scrapping was in very large crude carriers (VLCCS), totaling 41 ships of 8.9 million dwt in 1981.

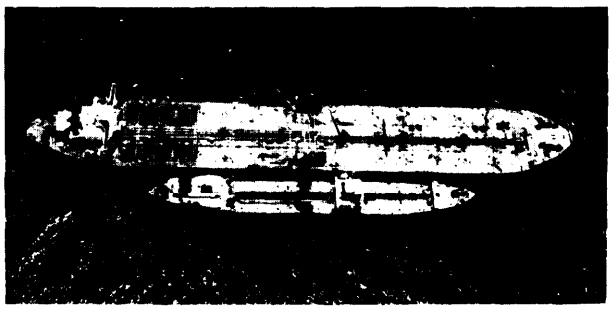


Photo credit: Atlantic Richfield

A supertanker transferring its cargo of crude oil to a smaller tanker in the Gulf of Mexico

The surplus of tonnage resulting from the relatively slow shrinkage of the available fleet is expected to prevail throughout 1983 with no apparent reason for improvement before 1985. The excess tonnage results from ships being used for storage, ships in layup (laid-up tonnage increased 11 million dwt to 17.3 million dwt at the end of 1981), and in less efilcient use of available tonnage, e.g., slower steaming.

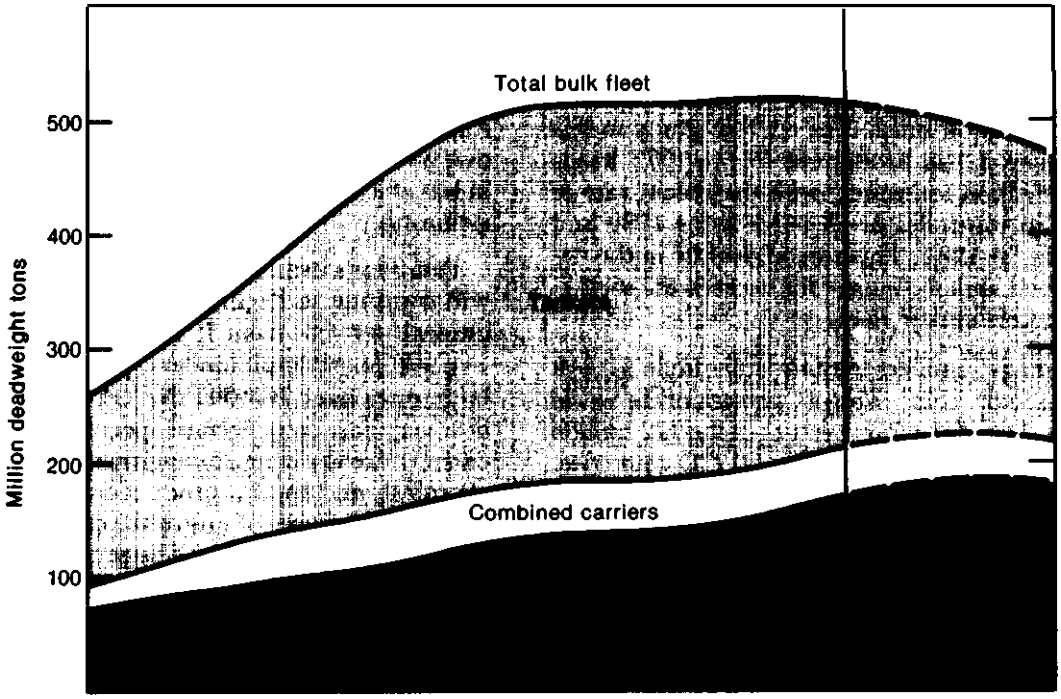
Fearnley's estimates that the world tanker fleet will continue to decline at a rate of about 5 to 6 percent per year from 1983 through 1986 (see fig. 11). While crude-oil tankers (particularly the very large ones over 100,000 dwt) are being scrapped at a *very* fast rate, certain specialized liquid-bulk carriers are showing some growth. Liquefied gas, chemical, and special-product carriers are viewed by some as an area of future shipping growth. Such vessels will never reach the huge tonnage of oil carriers but could serve a variety of changing world economic and trading needs, such as a switch in refining and chemical manufacturing closer to production fields and the need to produce petroleum from smaller and more remote oil and gas finds.

Dry Bulk

While total trade in crude oil was at a level of about 1.2 billion tonnes in 1981, the three major dry-bulk trades (coal, grain, and iron ore) totaled 700 million tonnes.

The dry-bulk fleet is the single major category of ships that was increasing in tonnage in 1982. While the number of tankers in the world fleet today is the same as 15 years ago, the number of dry-bulk carriers is three times the level of 15 years ago. Ore and dry-bulk carriers included 87.24 million grt in mid-1981, showing a 4. 7-percent annual increase. When grouped with the combination-carrier fleet (73 percent of which, on average, were in the dry-bulk trades in 1981), at 25.84 million grt, these ships comprise 27 percent of the world fleet. The rate of expansion of the dry-bulk fleet is increasing, owing to the delivery of ships ordered during good freight years in 1979 and 1980. Fearnley's data shows annual increases for the dry-bulk fleet of 8.9 percent and 9.4 percent for 1982 and 1983 respectively. Cargoes, however, are expanding less rapidly, only 2.5 percent in 1981, resulting in sur-

Figure 11.–World Bulk Fleet



SOURCE: Fearnleys, World Bulk *fled,* January 19S3.

plus tonnage in the fleet, Relatively little scrapping has occurred in the dry-bulk fleet in recent years.

The major commodities in the dry-bulk trades are grains, iron ore, and coal. Table 2 presents data on recent growth or decline in the volume of these commodities, as well as changes in the tonnage in the various ship-size categories. Most of the growth in the fleet is occurring in the larger size categories, while the iron ore trade, which uses the largest ships, is declining as steel production shrinks in the world recession.

Predictions of growth in the major dry-bulk trades include wide variations. Forecasts of growth in the 1980's of the iron ore trade, which is very sensitive to changes in economic growth, vary from 1.4- to 7.3-percent annual increase. For the coal trade, estimates of the tonnage to be shipped by the year 2000 range from 3.5 to 6 times the 1979 levels. Grain tonnages are closely linked to climatic events and are even more difficult to predict. Even though trade may grow, Fearnley projects that the size of the dry-bulk fleet will level off by 1985 because of the large present oversupply of tonnage.

Table 2.—Comparison of Changes in the Dry-Bulk Fleet and Dry-Bulk Seaborne Trade

	End 1980	End 1981	
DWT category	**1,000 dwt**	**1,000 dwt**	**% growth**
Drybulk fleat			
10,000-17,999	**11,624**	**11,643**	**0.2**
18,000-24,999	**18,522**	**19,110**	**3.2**
25,000-39,999	**47,312**	**49,126**	**3.8**
40,00049,999	**11,379**	**11,739**	**3.2**
50,000-79,999	**38,917**	**42,663**	**9.6**
Over 80.	**61,570**	**65,682**	**6,7**
Total	189.324	199.963	5.6
Commodity	**1960**	**1981 (est.)**	**o/o growth**
Major bulk seabome trade			
Grain:			
Miiiion tonnes	198	**204**	**3.0**
Miiiion tonne-miies	**1,087**	**1,120**	**3.0**
Average cargo size 27,000 dwt			
Coai:			
Miiiion tonnes.	**188**	**1%**	**4.3**
Miiiion tonne-miies	**952**	**1,030**	**8.2**
Average cargo size 51,400 dwt			
iron ore:			
Miiiion tonnes	**314**	**303**	**-3.5**
Miiiion tonne-miies	**1,613**	**1,580**	**-2.0**
Average carao size 88,500 dwt			

SOURCES: Fearnley8, World Bulk Fleet, January 19S1 end January 19S2, including combination carrtere.
Fearnleys, "Review 19S1." Compiled in Maritime Transport, 19S1 OECD.

Future developments in the world dry-bulk fleet could have a significant impact on the United States as a major bulk exporter and significant importer, with the possibility of substantial future growth in selected commodities later this century. The fleet and the trades need to be monitored carefully by the Federal Government if policies are to reflect accurately changing world needs.

General Cargo

The world general-cargo fleet encompasses a variety of ship types, including breakbulk, partially or fully containerized, vehicle carriers, lighter ships, and RO/RO ships. Due to the greater diversity of this fleet, there are fewer general statistics describing its status and trends. The amount of tonnage in all types of general cargo ships either was declining or was growing at a slower rate in 1980 and 1981 than in previous years, The general-purpose cargo fleet included 81 million grt in mid-1981 for an annual decline of 2.2 percent, the first absolute reduction in the fleet since 1974. In part, this reduction is due to the shift to containerization, as ships without container-handling capabilities are excluded from some trades. The tonnage in unit-load ships (including fully container, vehicle, and lighter carriers) grew at a reduced annual increase of 10.5 percent to a level of 15 million grt. The slowing of the expansion of the unit-load carriers reflects overcapacity in this sector. However, growth in the container fleet is expected to surge again over the next few years due to orders for new ships placed in 1981. At the end of 1981, the additional capacity on order was 23 percent of the existing fleet. Interestingly, however, most of the ordering in 1981 was for ships capable of handling both containers and breakbulk cargoes.

In 1981, growth of the containerized fleet (estimated at 15 percent in twenty-foot-equivalent units (teu)), far exceeded the 8-percent growth in containerized cargo. For the liner trades in general, the amount of cargo available has been level. Thus, the rate of increase in supply of shipping is exceeding the increase in demand. Part of this may be explained by a switch to slower speeds to save fuel costs, which in turn requires more ship capacity to move cargo at the same rate. An additional pressure on the historically dominant fleets is increasing competition from noncommercial nationalized shipping lines, notably from the U.S.S.R. and newly industrialized East Asian countries.

Photo credit: Maryland Depadment of Transportation

A heavy-lift crane loading general cargo (a large machinery part) for export

Trends in National Fleets

Comparing the distribution of ship tonnage today with that in 1970, the developing countries and the open-registry countries significantly have expanded their share of the world fleet, at the expense of OECD countries. The most recent data (mid-1980 to mid-1981) indicate that the developing countries are continuing to make gains in absolute and relative terms. Several of them, notably in Southeast Asia, are pursuing explicit policies to ex-

pand their fleets and to carry a substantial portion of their foreign trade in their own ships.

The composition and age of the fleets vary. In the OECD and open-registry flag fleets, nearly one-half of the tonnage is in oil tankers, with almost another one-quarter in ore and dry-bulk carriers. In contrast, nearly one-half of the fleets of the U.S.S.R. and Eastern Europe are general cargo ships, with oil tankers comprising another one-quarter. The developing countries have more diverse fleets, consisting of about 30 percent of the tonnage in each of the oil tanker and general cargo categories. In comparing the age of the major fleets, the United States has by far the greatest percentage, 21 percent, of its fleet by tonnage, in the oldest category, greater than 30 years, with 45 percent less than 10 years old. About 73 percent of the Japanese fleet is less than 10 years old. In general, the OECD fleet tends to be younger than the rest of the world, which often receives OECD ships secondhand. 1°

It is important to note that major U.S. maritime business interests participate in the ownership, management, and decisionmaking for very large shipping enterprises that use the so-called flags of convenience, This fleet typically operates outside direct U.S. Government control or influence but within a variety of internationally agreed standards and accepted practices. This ‘‘United States effective control’ fleet, however, does ci.rry almost all of our petroleum imports, a large portion of our coal and grain exports, and many other commodities significant to our international trade. U.S. maritime policies, therefore, must recognize the importance of this fleet both to U.S. business interests and as a factor in our ability to promote trade in the future.

Trends in Ship Types and Features

Two major changes influencing shipping in recent decades, and likely to continue to do so in the future, are automation of ship systems and specialization of ship types. Developments in both of these areas are discussed in greater detail in chapter 5. (A third important trend is in changes in both propulsion systems and ship design to promote energy efficiency, also discussed in ch. 5.)

The past decade has seen a proliferation of specialized ship types, causing a number of changes in the world shipping industry. One result is that there is now less flexibility to shift ship tonnage from one trade to another as markets change. As an example, ships designed for specific trades, such as VLCCS for the Arabian crude oil trade, cannot be used economically in other oil transport routes, Consequently, the economic risks when a tonnage surplus exists are magnified.

A second major impact from specialization is the trend toward unitization of cargo. Many ships are designed now to carry a specific type of cargo, such as vehicles, or cargo that is transported in uniform units, such as containers. Containerization has transformed the general cargo business. Not only has the type of ship changed dramatically, but trade routes are shifting depending on the availability of container-handling facilities at the various ports. The compatibility of containerized cargo with both land and water transportation systems has led to the streamlining of intermodal transportation services with the introduction of single through rates and through bills of lading. Ocean carriers have expanded their activities from providing strictly port-to-port service to offering consolidated intermodal transport in which the seaborne leg is just one part of point-to-point service. As a result, the availability and interface with rail service is also altering traditional trade routes.

The rate of technological change in general is increasing and maritime policies must be able both to foster and to accommodate that change if the United States is to participate in future shipping innovations.

Trends in Shipping Economics

The economic status of any shipping operation will be determined by the relative levels of costs (capital and operating) and revenues. As discussed previously, demand and freight rates, which determine revenues, are presently at severely depressed levels in all shipping sectors. Given the global nature of the shipping business, the slump in the market tends to affect all operators. Competition

[10]Data on the composition and age of the fleets is from *Maritime Transport 1981* (Paris: Organisation for Economic Cooperation and Development, 1982).

among commercial fleets for the available revenues is intensified by political factors. More and more countries have instituted cargo preference policies reserving some or all cargoes for their own fleets. In addition, some countries have nationalized, noncommercial fleets that are insensitive to nonprofitable freight rates. These political trends are discussed more fully in chapter 7.

Traditionally, operators in the liner trades have formed cartels or adopted cooperative business practices within conferences that are intended to restrict competition and allocate the available market. Such practices are common worldwide and competition is even more restricted in non-U. S. trades. Bulk operators, on the other hand, traditionally have favored and followed practices of open competition. Bulk shipping also has been populated by many individual entrepreneurs who take extreme risks for high returns. Present economic conditions and the massive oversupply of bulk-ship tonnage, placing some large banks at risk, have led some to reconsider bulk-shipping practices. The larger economic risks of future shipping ventures probably will foster industry restructuring toward managing competition.

There are wide variations in both the capital and operating costs among various countries. National policies to protect and promote national fleets and industries (see ch. 7) complicate this side of the economic equation as well. Capital costs are a major concern to shipping interests. New investment packages are becoming larger and more difficult to finance. Joint ventures and cooperative arrangements are growing. And there is a trend toward reducing high-risk investments caused by speculative building in the past.

Increasing fuel costs are felt by all fleets. For U.S.-flag vessels, they currently represent nearly 50 percent of operating costs, as compared to 10 to 15 percent in the early 1970's. Responses include both changes in ship design and propulsion systems, notably shifting from steam to diesel ships, and changes in operating procedures, such as slower steaming speeds to increase fuel efficiency. While fuel prices currently are lower than in the recent

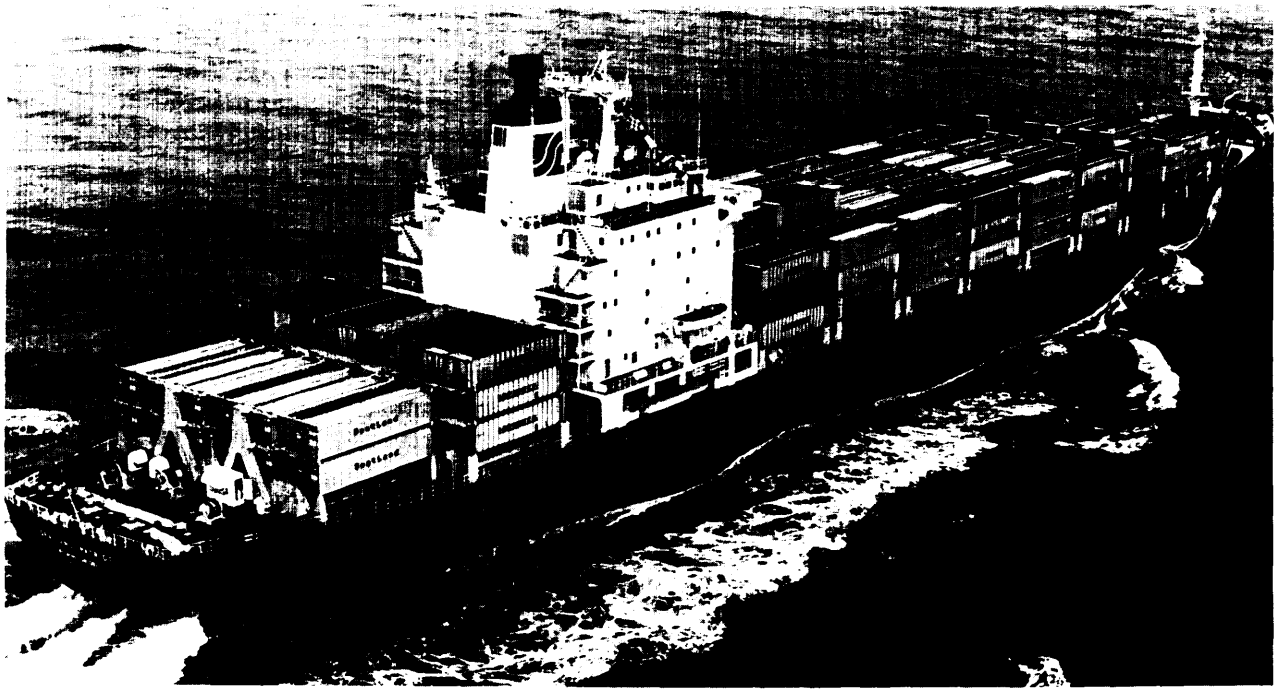


Photo credit: Sea-Land Industries

Economics have forced a shift to slower speed, fuel-efficient containerships—the *Sea-Land Patriot,* first of 12 diesel-powered ships built in Japan and Korea in 1980 for Sea-Land Service

past, they can be expected to resume their increases later in the decade, and fuel conservation will continue to be an important influence on shipping. Advances in fuel efficiency are discussed further in chapter 5.

Crew costs represent one of the larger variables among maritime nations. One estimate places U.S. wage costs at six times that of a Chinese crew and twice that of a Japanese crew. 11 With wages on U.S.-flag vessels accounting for 20 to 50 percent of operating costs, 12 13 depending on vessel type) there are increasing pressures for greater automation of ship systems. It is particularly important for maritime policy makers to monitor trends in crew requirements and costs as key factors in the competitiveness of shipping operations.

[1] I Paul Ackerman, ' 'Comparative Operating Costs for U. S.- and Foreign-Flag Ships, " *SNAME, A Combined Symposium on Ship Costs and Energy, New* York, Sept. 30-Oct. 1, 1982.

[12] Ibid.

[13] Gary J. Baham, "Final Report, Trends in Vessel Technology for Maritime Trade and Shipping, " for the Office of Technology Assessment, December 1982.

CURRENT STATUS OF AND TRENDS IN WORLD SHIPBUILDING

Shipbuilding Industry Today

Merchant shipbuilding serves the demand for world shipping discussed above. The output of merchant shipbuilding over the recent past is summarized in figure 12. Output is expressed as grt, which is a measure of total ship volumetric capacity, and thus provides a better guide to shipbuilding output than the number of ships.

The dominance of Japan is readily seen in figure 12, followed by the Association of West European Shipbuilders (AWES), which was responsible for one-third of world merchant shipbuilding output in the period. AWES is strictly a voluntary association with the main purpose of lobbying the European Economic Community (EEC) and in no sense represents a unified commercial force. The relative significance of the nations participating in world shipbuilding today is seen best in the orderbook shown in figure 13 and table 3. The most striking feature is the rise of South Korea to second place, principally at the expense of AWES.

The majority of the shipyards of the developed world are suffering from the lack of orders and cutthroat competition brought about by the world recession and the heavy overtonnaging in the major ship types. The yards that survive the crisis either will be those with government support or those that so improve productivity that they can compete without actually losing money until a recovery comes.

Government aid has been available in one form or another to almost all the shipyards of the world over the past few years. Now, however, many governments either are cutting aid altogether or tying its provision to massive yard improvements in an attempt to drive the yards to greater productivity so that the aid is not wasted.

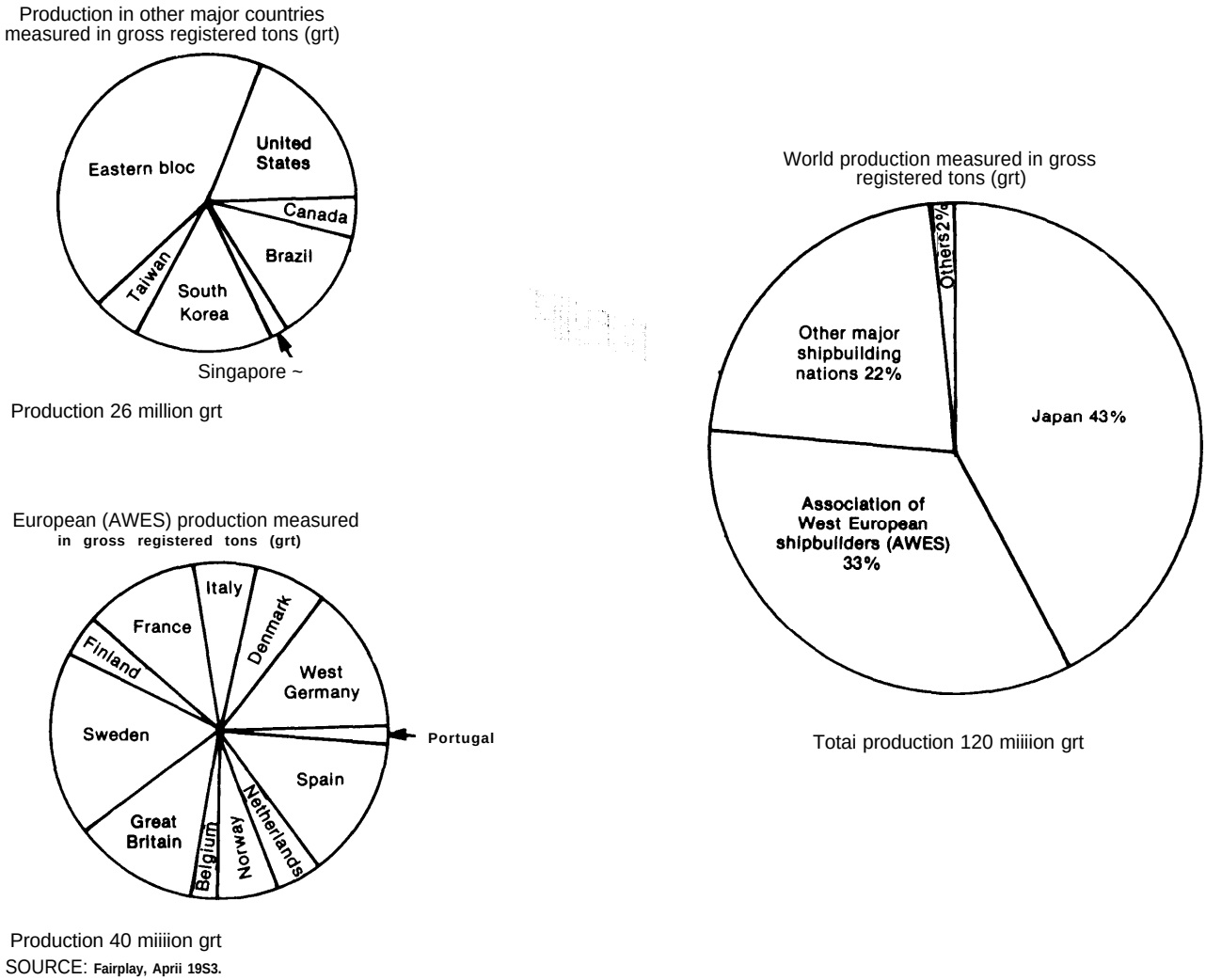
Thus, either as a result of the removal of government aid, the terms of its provision, or the orders crisis previously mentioned, most of the shipyards of the developed world are aiming for vast improvements in productivity. These will be gained by a mixture of improved efficiency of operations and the applications of new technology in shipbuilding.

Meanwhile, technological advances are occurring in shipping operations, advances with which shipyards must keep pace if they are to produce marketable ships and remain competitive.

Shipyard Capabilities and Capacities

The period from 1970 to 1975 saw a general upsurge of expenditures on facilities development in

Figure 12.—World Merchant Shipbuilding Production, 1976-81, by Country



SOURCE: Fairplay, Aprii 19S3.

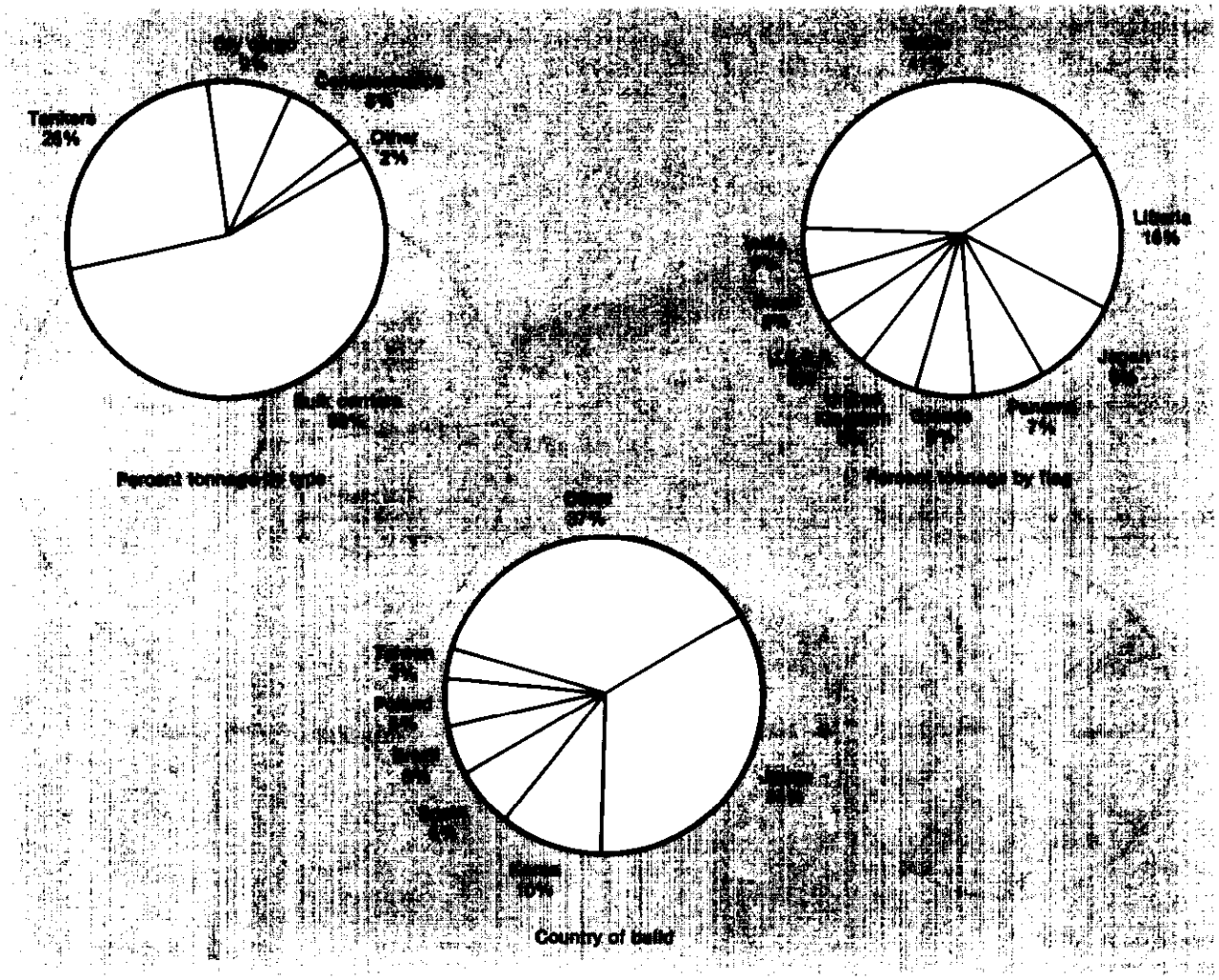
most of the world ~hipbuilding nations. To some extent this resulted in improvement of existing facilities, although many new yards also were built. The culmination of this investment period around 1973 to 1975 saw the peak of world shipbuilding demand. Since that time, demand (and therefore output) has declined worldwide and only in certain developing countries (notably South Korea) has investment in new facilities continued. In the majority of established shipbuilding countries the very sharp decline in output since 1975 has led to:

- large reductions in labor force numbers;
- closure of many facilities;
- diversification into other activities (notably offshore and land-based industrial fabrication); and
- a virtual "credit war' and, in many countries, a degree of overt or covert protectionism.

The last 2 to 3 years have seen the development of a second phase in most countries' reactions to the continuing surplus of shipbuilding capacity:

- those countries that had *undertaken major* cutbacks in capacity in the period 1975-81 (including Japan and most AWES countries) have generally decided that "enough is

Figure 13.—Merchant Ships on Order Worldwide



SOURCE: Fairplay, April 1983.

enough' and, for both sociopolitical and strategic reasons, further cutbacks are being resisted increasingly;

- those countries that had resisted cutbacks during the late 1970's—including some AWES countries—are now facing up to the necessity of making cutbacks;
- in the majority of countries, increasing emphasis has been placed on improving productivity (i. e., making better use of existing facilities) as a means of cutting losses; and
- with the notable exception of South Korea, those advanced developing countries that in the 1960's and early 1970's had seen shipbuilding as a priority area for development (e. g., Brazil, Taiwan) have lost much of their original enthusiasm.

Throughout this period, several developing countries (e. g., India, Indonesia) have expanded their shipbuilding industries in line with their general policies of increasing industrial independence.

South Korea is the prime example of a country that intends to consolidate its past expansion, regardless of the lack of orders worldwide. The country claims a total building capacity of 4.1 million grt in 1981 and the aim is for 6 million grt per year by 1986. The South Koreans are aiming

Table 3.—Ships Currently on Order (countries with 1 million dwt or more, with the United States added for compadson)

Country of build	Dry cargo		Tankers		Bulkers		Total	
	Number	Millions of dwt	Number	Millions of dwt	Number	Millions of dwt	Number	Millions of dwt
Japan	186	2.2	73	2.8	271	12.5	530	17.5
Republic of Korea	60	0.8	; :	1.0	44	*3.2*	128	5.0
Spain	46	0,3	16	0.4	37	*2.5*	99	3.2
Brazil	20	0.2	11	0.5	41	*2.1*	72	2.7
Poland	61	0.8	14	0.9	20	0.9	95	2.5
Taiwan	23	**0.4**	3	0.2	15	1.3	41	1.8
U.S.S.R.	30	**0.3**	19	1.0	14	0.5	63	1.7
China	40	**0.4**	5	0.1	31	0.8	76	1,4
Yugoslavia,	13	0.1	34	1.0	6	0.3	53	1.4
Romania	46	0.2	4	0.2	17	1.0	67	1.4
United Kingdom	24	0.1	3	0.2	21	0,9	48	1.2
Portugal	7	0.1	7	0,8	6	0.3	20	1.2
Germany	76	0.7	5	0.1	9	0.4	90	1.1
India	3	0.1	—	—	24	1.0	27	1.1
Denmark	49	0.3	6	0.2	7	0.4	62	1.0
United States[a]	8	0.2	13	0.5	1	0.1	22	0.8
All others.	232	1.8	81	2.0	49	2.1	362	6.2
Total (April 1983)	*924*	9.0	318	11.9	613	30.3	1,835	51.2
Total (September 1982)	*929*	9.3	393	14.9	650	33.4	1,972	57.6

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for 10 percent of world orders by 1986; they now have 8.5 percent.

The productivity of South Korea's shipbuilding workers is only about half that of the Japanese—about 15 tonnes/man-year. (The South Korean Government aims to double this to 30 tonnes/man-year by 1986,)[14] The reasons for South Korea's success are several, but the most important is undoubtedly the low cost of labor.

If Korean yards succeed in doubling their productivity, coupled with their very large capacity, they will be a force with which to be reckoned. Their prices are already very low (average 15 percent below typical AWES prices), although it has been suggested that they have been making little or no profit at these levels. 1[5] They have in the past attempted to gain a key position by massive undercutting, and initially succeeded, but future petiormance may be different. South Korea's situation is important to the United States not only because they are a major ally and trading partner, but also because U.S. ship operators recently have contracted for major new buildings in Korean yards,

Since the massive slump in orders in 1975, the majority of the world's shipbuilders have agreed to reductions in capacity. Japan, by far the largest shipbuilding nation in the world, has reduced its capacity by 35 percent, according to the Shipbuilders Association of Japan (SAJ). The 23 major companies represented by SAJ employed 112,000 people in April 1974. By mid-1979 this was reduced to about 72,000 and remained at about that level through 1982. Unlike the Western European nations, whose capacity reductions took place in a piecemeal fashion, the Japanese industry cutbacks took place under what appears to have been fairly strict government control.

Despite the reduction, total Japanese shipbuilding capacity still is massive, and the yards are aware of the need to contract further if they are to remain competitive under the dearth of orders expected over the next 3 or 4 years. However, they do not intend to reduce their manpower further, except by the process of natural wastage,

[14] A & P Appledore Ltd., *Technical* and Capability *Developments in Shipbuilding,* prepared for the Office of Technology Assessment, November 1982.

[15] Ibid.

The Japanese philosophy, which is aided by the makeup of their conglomerate firms, is to restructure, shifting the emphasis away from direct marine involvement. The nonmarine activities consist primarily of shore-based machinery manufacture. In this way, they do not lose potential capability, but are not desperate for orders to maintain their present situation. They also are preparing to weather the orders slump by:

- concentrating on high-technoloy vessels; and
- carrying out concerted market research and a forceful marketing drive.

AWES is not a governing body, but acts as a consultative and monitoring organization. Thus, the actions taken by different yards and different countries within AWES do not all correspond to the stated aims of that body. For instance, in Belgium, Cockerills Yard (one of only two major yards) closed in 1982, but the government has stimulated naval building and construction for the inland waterways to help the industry. Building for their inland waterway industry serves a useful purpose in itself. In addition, the shipbuilding industry is a major consumer of steel, and the Belgian steel industry also is suffering greatly from the recession. Also, in the Netherlands, the government turned down a request for shipbuilding subsidies in early 1983, a situation that has led to the closing of the Verolme yard and the loss of 6,000 jobs.

The reductions in numbers employed in merchant shipbuilding by the member countries of AWES (except Portugal and Finland) are shown below:

Country	*Employees (end 1975)*	*Reduction in employment (December 1975-December 1981)*
Netherlands	22,700	*56%*
Sweden	14,000	48%
United Kingdom.	54,600	47%
West Germany . .	46,800*	*46%*
Italy	25,000	36%
Denmark	16,600	**30%**
France	27,600	29%
Norway.	18,600	29%
Spain	43,000	24%
Belgium	6,100	11%
AWES (overall) . .	275,000	about 3370

"Excludes military sh]pbuildmg,

SOURCE AWES/EEC/A & P Appledore

Only Finland has a modest but very healthy shipbuilding industry by any standard. They have concentrated on passenger cruise ships and ships that navigate in the polar regions and are recognized world leaders in these markets.

Other Nations

Not all LDCS have succeeded as South Korea has. Taiwan is producing work for its only major yard (China Shipbuilding Corp.) by building up the national fleet. This buildup follows in the spirit of multilateral cargo-sharing, although they are mainly building bulk carriers.

Brazil expects to lay off from 21 to 42 percent of its 178,000 shipbuilding work force in the near future. In the latter 1970's, Brazil was able to build a healthy shipbuilding industry by attracting foreign shipbuilders to open yards there to build their rapidly growing national fleet and to build ships for foreign buyers, backed by healthy credit facilities. Now, faced with a crippling national debt, they are unable to finance foreign buildings, and have to seek foreign finance packages and aid to build ships at all.

In the People's Republic of China the shipbuilding industry neither is expanding nor contracting to any marked degree. The work force remains fairly steady. However, they are making great strides to improve their productivity, which, coupled with low costs (labor and materials), will enable them to become very competitive. At the same time they are building up their national fleet, and the work so generated is keeping their yards busy. In addition, they are now marketing outside the People's Republic of China. They are in the fortunate position of taking orders for foreign new buildings without being driven to it from lack of work. Thus they are only taking work they want—work that brings learning, or that opens trade with a new country. They are building a modern, competitive industry within the existing framework. Should they choose to enter the international shipbuilding market in a major way, they would undoubtedly be a force to reckon with. There is, however, some doubt whether this will happen, given the depressed state of the industry worldwide and the large number of other industrial sectors competing for finance within the People's Republic of China.

The United States has a very large shipbuilding industry (described in ch. 4) compared with other maritime nations, with over 175,000 total employees in 1980 (compared with 160,000 in Japan). However, the United States has not competed in the world market for construction of merchant ships in the past 20 years. Merchant ship construction in the United States during the 1960's and 1970's has been almost entirely under Federal Government subsidy or for the domestic market where construction must take place in the United States by law. During these years the U.S. shipyards have been dominated by U.S. Navy construction, and today naval warship or auxiliary ship construction makes up over 90 percent of the major U.S. shipyards' business.

Finance

The whole subject of finance of shipbuilding is a thorny one but it is certainly true that few, if any, ships are built at present without credit (except behind the Iron Curtain). The battle to attract orders was waged largely with bigger and better credits until OECD laid down guidelines, known as the ''OECD Understanding' on credit terms. These have been modified, and the limit is now a maximum of 80 percent credit over a maximum of 8.5 years at a minimum rate of 7.5 percent per annum.

Not all shipbuilding nations are in OECD, and not all OECD members always abide strictly by the understanding. Thus, the understanding becomes a broad guideline. Meanwhile, merchant bankers feel that the period should be extended more in line with the life of a ship, while many governments, seeing large amounts of credit extended to developing nations that are struggling to service their loans, would like to reduce the credit limit.

It would appear unlikely, with a lack of new building orders and a massive shipbuilding overcapacity, that building credits will be terminated. On the other hand, it would appear very likely that direct yard subsidies will be reduced, if not removed, in many countries, as a means to force a reduction in capacity. Financial assistance is available in some countries for investment in new technology, provided it is linked to reduction of capacity.

Thus, in the near future, shipbuilding subsidies in the form of credit are likely to remain as a means of attracting orders, but direct financing available to the majority of shipyards is likely to be seriously curtailed.

Outlook for Commercial Merchant Shipbuilding

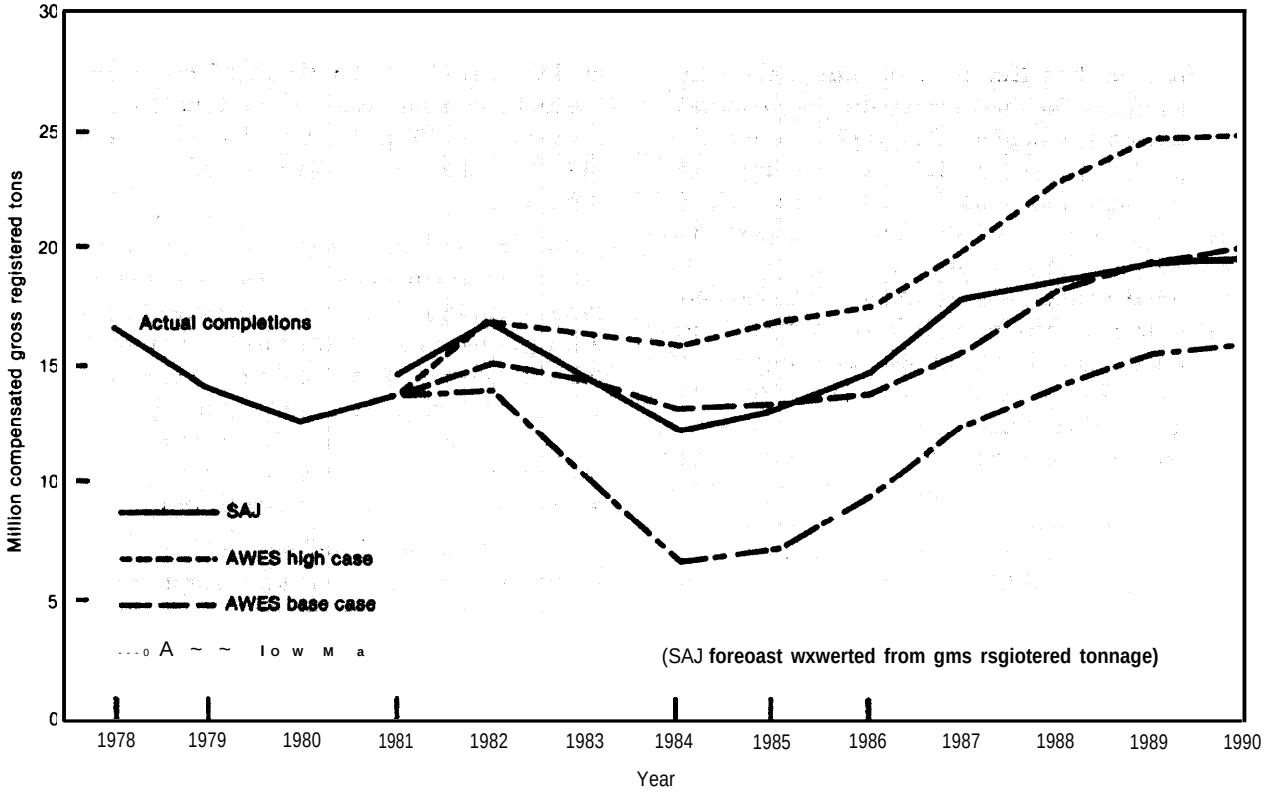
It is the volume and pattern of seaborne trade that generate the demand for cargo-carrying ships. However, the long leadtime in building ships and the uncertainty in predicting future trading markets contribute to an imbalance between supply and demand and to boom and bust cycles in shipbuilding, In addition, there is some purely speculative ordering of ships for the purpose of selling them later at a profit.

The present gross surplus of tonnage is due to ordering of tankers in the 1970's and the more recent ordering of bulk carriers. Petroleum and bulk-cargo markets were expected to expand rapidly, and ship operators and speculative buyers alike anticipated growing demand for new ships. Largely due to the severity of the world recession, the growth in the freight markets did not materialize.

The presence of a tonnage surplus, which is almost always present although fluctuating in size, tends to act as a check, dissuading operators from the more extravagant ordering. For this reason, no sharp increases in new tonnage delivered can be expected for a number of years. The latest forecasts from AWES and SAJ (fig. 14) both show that the level of future ordering is likely to be suppressed for the next 3 to 4 years.

The major shipbuilding industries in Japan, South Korea, Europe, and elsewhere, compete for each order in a worldwide market. The U.S. industry not only is insulated from that world market, producing only a few percent of the world output

Figure 14.—New Building Demand Forecasm, 1982



SOURCE: A & P Appledore, 19S2.

of commercial vessels, but does not meet its own domestic demand for merchant ships.

Table 4 shows an approximate breakdown of the 1982 world orders in terms of the percentages built by each country or group of countries, the percentage expected to be delivered that might go to owners domiciled in the various countries, and the resulting percentage surplus or deficit. While these figures are only projections, they are approximately of the right magnitude. Overall, West European builders will satisfy their own demand, although certain countries such as Denmark, France, and Spain might get more than their share of ships built. Eastern European builders also will build predominantly for their own demand, although yards in Poland and Romania can be expected to take a percentage of external orders. Japan and South Korea have captured the remaining market for foreign construction.

These percentages may well change by the end of the century. But it is of interest to take the tonnages from the SAJ forecast (fig. 14) and to distribute them according to the market shares shown in table 4. This is depicted in table 5. Tonnages produced in 1975, the peak year, are shown for comparison. The forecast tonnages for Japan and Western Europe are considerably less than the shipbuilding capacity remaining in those areas after their reductions in capacity of approximately 35 percent since 1975.

The picture that emerges, therefore, is one of:

. increased de facto dependence on nat ion a] fleets (including vessels owned by nationals but sailing under another flag) as the basis of future new building orders;

Table 4.—Approximate Percentages of the World Orderbook

Country	Percentage of total dwt	Percentage for national fleets[a]	Percentage building surplus
Japan	40 "/0	320/o	80/0
South Korea	9	3	6
China	3	3	—
Taiwan	2	2	—
AWES members	23	23	—
United States	1	2	-1
Eastern Bloc	20	18	2
Other	2	17	-15
Total	100	100	0

aAS per Count~ of domlcjle of owner (i e, not by registered f~a9)

SOURCE "Fairplay" World Ships on Order, October 1982

Table 5.—Comparison of Shipbuilding Forecast Tonnages[a] and 1975 Production for Selected Countries

Country	*1975b* product ion	1985C forecast	*1990'* forecast
Japan	17.0	5.6	9.9
South Korea	0,4	1.3	2.2
Taiwan	Negligible	0.3	0.5
AWES members	12.9	3.2	5.7
United States	0.5	0.1	0.2
China	(d)	**0.4**	**0.7**
Eastern Bloc	(d)	2.8	4.9

aTonnages expressed In milllons of 9fl
[b]Lloyds Register
[c]SAJ Forecast
'Figures not available individually

. much smaller international ' 'open market for new buildings, in which the principal protagonists are Japan and South Korea;
. many developing countries building up or maintaining existing shipbuilding industries specifically to cater to local demand;
. continuing emphasis among the **AWES nations**, Japan and also Korea on:
  — diversification into allied sectors as a means of creating work,
  — technological development, both of the \'essels themselves and in the way they are built, as a means of improving competitiveness; and
. some further reductions in capacity (particu - larly among AWES countries) but much less on average than has been seen over the 1975-82 period.

Most of the established shipbuilding nations of the world accept the need for the industry to contract further, but do not want to contract further themselves. The Japanese need to maintain some 40 percent of the world new building market in the future if they are to maintain reasonable employment in their yards. South Korea is expanding and will need to attain 10 percent of world output. This they will probably succeed in doing since their productivity is rising faster than their costs.

China and Taiwan are unlikely to be in the market for foreign orders in any major way, but by keeping their yards occupied with domestic orders, they will still have the capacity and capability to take foreign orders whenever the upturn in orders should occur. Improving productivity and low costs will make them competitive.

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WORLD ECONOMIC AND TRADE OUTLOOK 1982-2000

Introduction

In order to assess the "long-run" outlook for shipping, OTA asked Wharton Econometrics, Inc., to prepare an outlook for world trade through the year *2000*. It is presented because any analysis of the future of shipping or shipbuilding must consider the directions world trade will take. Trade is dependent on economic growth, and the demand for ships is derived from trade. It is important to note that any forecast that attempts to predict events many or even several years ahead is subject to error. This forecast assumes no major surprises.

Based largely on their world econometric model, Wharton prepares 10-year world economic outlooks covering some 27 countries and regions, forecasting parameters such as gross domestic product (GDP), inflation, and unemployment. For purposes of this study, Wharton's 1982-92 outlook was extrapolated to the year 2000. Using this baseline outlook, dynamic trade-flow matrices, which ensure global consistency, were used to generate annual bilateral trade flows in value terms for all countries and regions in the system, for all years of the forecast for three merchandise groups: bulk commodities, fuels, and manufactured goods. The units of measure are based on value converted to dollars for all countries. These, in turn, are adjusted in order to generate constant-dollar measures (in 1975 dollars) of the volume of exports and imports. At this point, the bilateral trade flows in constant-dollar volume terms are converted to bilateral *maritime* trade tonnages by application of conversion equations developed econometrically on the basis of U.S. Bureau of Census, OECD, and U. N. trade data on total maritime trade tonnages by category. In addition, corrections were made to eliminate nonmaritime trade flows and to shift coal tonnage from fuels to bulk commodities. Thus, the final product is an overall projection to 2000 of world waterborne trade flows broken into dry-bulk, liquid-bulk, and general cargo sectors.

Economic Forecast

The economic outlook developed by Wharton is presented in two parts: the near-term outlook, 1982 to 1987, derived from Wharton's December 1982 World *Economic Outlook,* and the long-term outlook, derived from Wharton' January *Long-Term World* Economic Outlook 1987-92, with extrapolation of key indicators to 2000. Tables 6 and 7 summarize the assumptions and major trends predicted for parameters relevant to this study.

Near- and long-term projections of growth of GDP for selected countries and regions are shown in table 8. The basic economic outlook based on this projection for the 5 years, 1982-87, is for con-

Table 6.—World Economic Outlook, 1982-87

Forecast:
- World economic growth will average 3.2 percent from 1983 to 1987. U.S. economic growth will average 3.4 percent after -1.6 percent in 1982.
- Unemployment rates will fall slowly from their postwar historical highs.
- Inflation will moderate worldwide.
- Balance-af-payments problems of developing countries will persist because of high real interests costs on their accumulated debts and sluggish growth in the developed countries.
- Economic growth in the oil- and nonoil-exporting LDCS will be constrained by balance-of-payments problems and retarded demand for their exports. The major bright spot in the developing world will be the newly industrializing countries of the Pacific Basin.[a]

Assumptions:
- Real "fuel- and nonfuel-commodity prices will decline in 1982 through 1985 or 1986, respectively, reflecting slow world growth.
- Monetary policies will be moderately restrictive, resulting in high real interest rates that will retard investment as well as inflation.
- Fiscal policies will not be stimulative as governments attempt to bring large fiscal deficits under control.
- High unemployment and lack of flexibility to use monetary and fiscal policies will encourage more protectionism in the developed countries, slowing world trade growth, especially manufactured goods.

what Is, the Phillipines, Taiwan, Singapore.

SOURCE: Office of Technology Assessment.

Table 7.—World Economic Outlook, 1987"2000

Forecast:
- World economic growth will average 3.0 percent with U.S. growth averaging 2.8 percent.
- Unemployment rates will decline slowly but will remain discouragingly high, encouraging protectionism. Mismatches of jobs available in growth industries and skills of unemployed will persist, encouraging more artificial employment-creating techniques.
- Lower growth of real and nominal wages will lower inflation.
- Labor force growth will moderate due to lower participation rates (discouraged workers) and demographic factors.
- Regeneration of depleted capital stocks will promote rel. atively faster growth in Japan, but in Europe the existing capital stock will not be quickly regenerated because of low rates of return and low competitiveness with newly industrializing countries.
- Real interest rates will tend to decline to historical averages of 2 to 3 percent.
- Pacific Basin developing countries will continue their relative rapid growth. Latin American countries will show much slower growth compared with the 1970's.

Assumptions:
- Real fuel- and nonfuel-commodity prices will rise relative to manufactured goods prices.
- Monetary policies will be moderate, permitting money stocks to grow in line with nominal GDP growth.
- Fiscal policies will continue to be nonstimulative as the importance of Government spending declines because of demographics and public policy.

SOURCE: Office of Technology Assessment.

tinuing setbacks to sustained recovery in the United States, Europe, Japan, and Canada. The most significant feature is the projected weakness of growth in Europe and Japan compared with the 1960's and early 1970s. The delays in Japan and, particularly, Canada are related to the sluggish U.S. performance, but more general causes are the effects of persistently high real interest rates, especially in Europe and Canada, and the continued pessimism among investors and consumers, reinforced by higher unemployment rates. Also, a significant part of the growth of the developed countries in the 1970's was due to exports to the developing countries and to the centrally planned economies (CPES). Import retardation or restriction by the LDCS and selected CPES, as they seek to correct their external accounts, will diminish this impetus from abroad.

Forecast economic growth beyond 1987 actually is slower overall than predicted for the previous 4 years. In part, this is because the 1983-87 growth rates appear higher due to the trough-to-peak problem of using 1983 as the initial year, when most countries are at a lower-than-trend rate of growth. However, the more fundamental causes include the relative changes in capital formation, labor force dynamics, and labor productivity.

This extrapolation may be pessimistic given the long period of sluggish growth in the 1980's. By 1992, a buildup of corrective forces could be generated by a general recognition that inflation was under control and structural adjustments in old industries generally were completed. Capital stocks would have to be replenished, and new industries would be burgeoning. However, for some purposes, a conservative outlook may be the most prudent, given the tendencies of the maritime industry to overanticipate periods of recovery,

Outlook for Trade Flows, 1982-2000

Using the model, Wharton has forecast total trade flows (including nonmaritime trade) in three major commodity groups: fuels (including coal), nonfuel commodities, and manufactured goods.

Table 8.–Growth of Real GDP (annual average compound growth rate)

	1960-73	1973-83	Recovery 1983-87	Moderate growth 1987-2000
World	5.5	2.6	3.3	3.1
Developed countries	5.0	2.1	3.1	2.7
United States	4.1	1.9	3.5	2.8
Japan	9.9	3.4	3.3	2.7
Europe	4.8	1.8	2.6	2.4
West Germany	4.5	1.5	1,9	2.0
Developing countries	6.3	3.6	4.6	4.6
Oil-exporting	8.2	1.6	4.9	4.3
Oil-importing	5.5	4.3	4.6	4.8
Centrally planned economies	7,2	4.0	2.9	3.0

SOURCE: Off Ice of Technology Assessment.

Past and predicted average compound-growth rates for world exports are shown in table 9. For comparison, GDP growth rates for comparable periods have been included. Following the trend in growth of world GDP, world trade is predicted to expand faster after 1985 than during the current period. For the world as a whole, trade in manufactured goods is expected to regain its traditional position as the fastest growing sector. Growth in trade in nonfuel commodities remains level. We should note especially that growth in trade in fuels picks up after a ''reconstruction' period, when the movement to conserve fuel relative to GDP growth, due to the dramatic upward shifts of energy prices in the 1970's, has run its course.

The trends and predictions for bilateral trade flows include several shifts with ramifications for the shipping industry. The changing pattern of fuels trade among countries and regions has already caused major dislocations in the bulk-shipping sectors. The first and second oil shocks, emanating initially from the Organization of Petroleum Exporting Countries (OPEC) members among the developing countries, led to efforts by the developed countries to reduce fuel imports and to increase their own exports of fuels. This was manifested in the shipping industry by the well-known glut of oil tankers and the strenuous efforts to move coal by dry-bulk carriers across the oceans—the latter trade had been declining steadily. The share of volume of trade in fuels shifted dramatically from the developing to the developed countries as relative prices shifted.

The other major shift of note in the trade outlook is the change in the status ofJapan. Wharton's projection shows only average growth for Japan as her period of rapid industrialization fades and a high-technology, more consumer-oriented society emerges. Accordingly, after the export drives that were evident until 1981, import growth is expected to overtake export growth in the 1985-90 period. Market forces and the threat of protectionism will open Japan's manufactured-goods marketplace to new competition, especially from the newly industrializing nations of the Pacific Basin. Indeed, Japan could be an engine of growth for all southeast Asia analogous to the role played by the United States vis-a-vis all developing nations. The developing countries of the Pacific Basin region thereby could have two sources of export growth—the United States and Japan—and thus grow faster than other developing areas.

Table 9.—Average Compound Growth Rates for World Trade Exports and GDP

	1975-80	1980-85	1985-90	1990-2000
World trade (exports):				
Total	5.7	3.1	4.7	**5.0**
Nonfuel	5.7	4.0	3.9	3.9
Fuel	1.6	-0.2	3.4	4.0
Manufactured goods	6.8	3.6	5.2	5.5
World GDP	3.8	2.2	3.0	3.1

SOURCE: **Office of Technology Assessment.**

A shift toward the Orient could mean a decline in the relative importance of trade with Europe—and what trade would remain could become regional rather than intercontinental. European-based sources of energy, **including the U.S.S.R. also** could lower the importance of oil shipping. Nonfuel-commodities growth would not take up the slack. This, coupled with the relative slowdown of U.S. nonfuel-cornmodities-imports growth, would lower the relative importance of the dry- and liquid-bulk Atlantic trades between 1987 and 1992, compared with the fairly vigorous growth during the 1973-79 period. The glut of shipping in Atlantic bulk trades today is a harbinger of these trends.

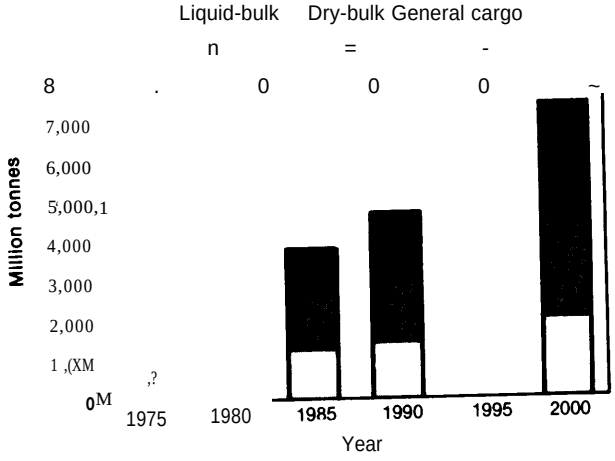
Outlook for Seaborne Trade

World Trade Patterns

This section summarizes Wharton's projections of bilateral maritime trade flows between countries or regions to 2000. The total tonnages shipped or projected to be shipped from 1975 to 2000 in the liquid-bulk, dry-bulk, and general cargo categories are shown in figure 15. * Between 1985 and **2000,** the fastest growth is projected to be in general cargo trade with the slowest growth in liquid-bulk shipments. As a result of these differing rates, liquid-bulk, which represented the largest share of total trade in 1975 and 1980 (45 and 40 percent, respectively), in this forecast would account for only 28 percent in 2000. The volume of trade in both dry-

*In this section, data for liquid-bulk include only petroleum and petroleum products. However, other liquid-bulk cargoes, such as chemicals and liquefied natural gas, account for such a small fraction of the total that this approximation is appropriate for forecasting purposes.

Figure 15.—World Seaborne Trade

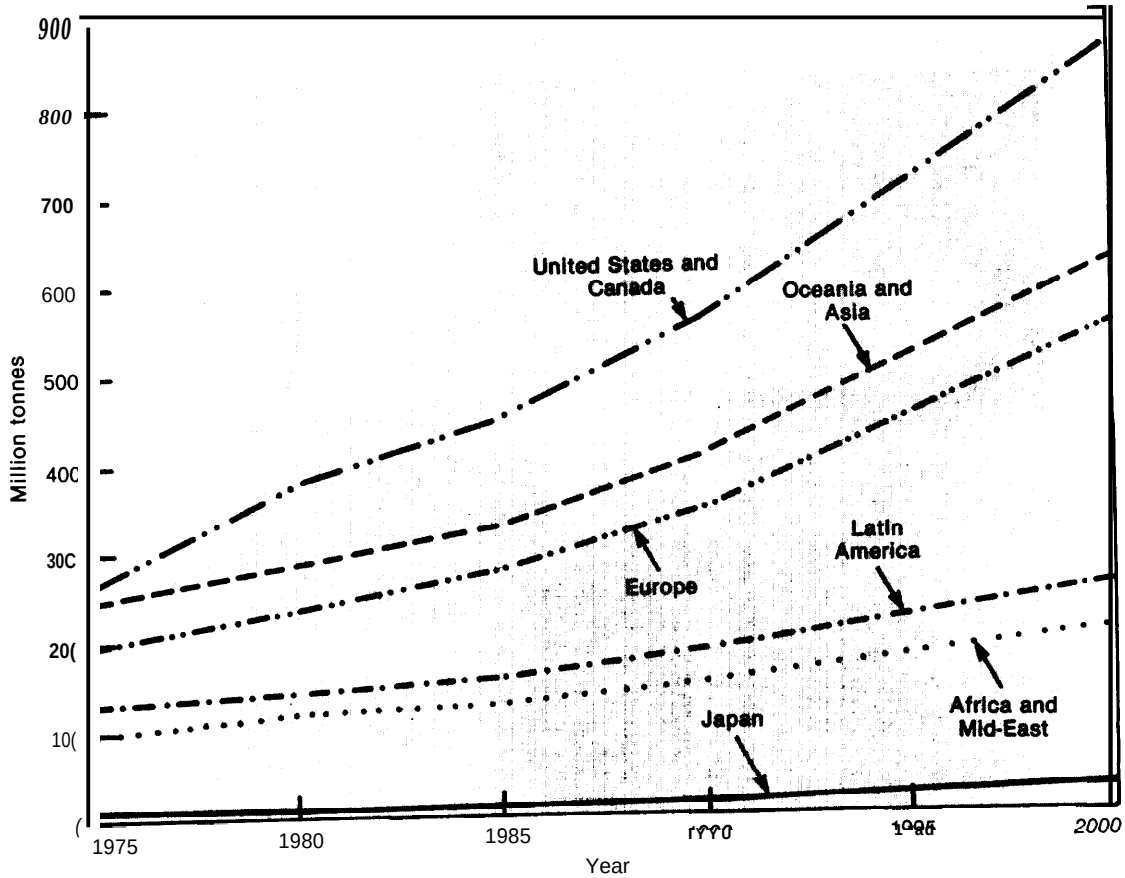


bulk and general cargo is projected to exceed that in liquid-bulk by 1990.

In the dry-bulk sector (fig. 16)* expanding exports of coal from the United States, and of subsidized agricultural products from Europe, are expected to increase the shares of export trade from these regions. The shares of the traditional commodity suppliers in the developing world, (i. e., Africa and Latin America) correspondingly decline.

● For figs. 16 through 21, showing regional distribution of world seaborne trade, Oceania and Asia includes Australia, New Zealand, Afghanistan, and Pakistan to Thailand and south, plus South Korea, Taiwan, and Hong Kong and the Asian CPEs. Europe includes the British Isles, Mediterranean, and Northern Europe, and the European CPEs.

Figure 16.—World Seaborne Dry-Bulk Exports, Regional Distribution



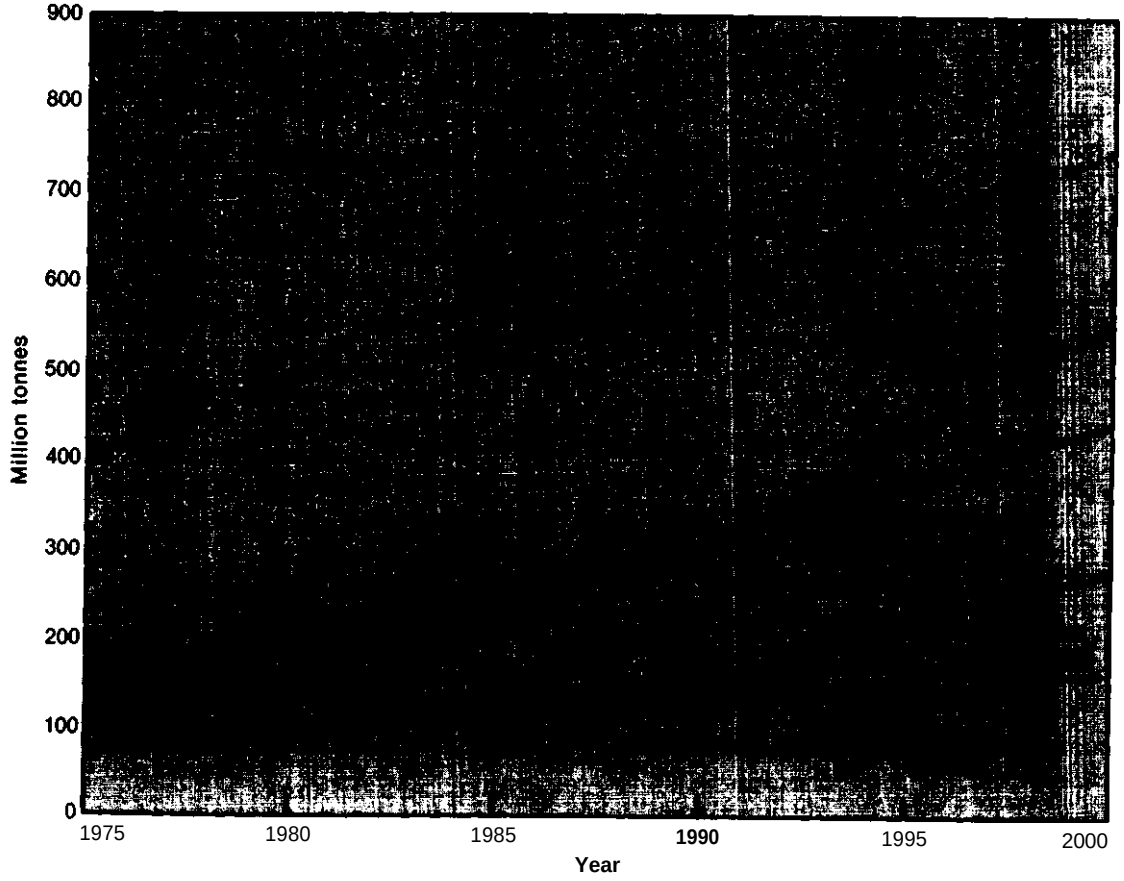
SOURCE: Wharton Econometrics, Inc

These trends for the developing world are to be expected as market forces, as well as public policy, shift these economies away from being traditional agricultural- and mineral-commodities suppliers and toward industrialization with growing exports of manufactured goods. This generalization is true especially of South Asia, whose share of general cargo will be seen to grow even faster than its bulk-commodity share.

For shipborne imports of dry-bulk goods (fig. 17), there are few surprises given the economic outlook for rapid growth in South Asia and the industrialization pace of developing countries in general. Thus, their own production of dry-bulk commodities is projected to become either less important or more devoted to serving their own internal development. Hence, they will tend to import more and export relatively less of this cargo. Shares of dry-bulk imports in Europe and the United States are expected to decline.

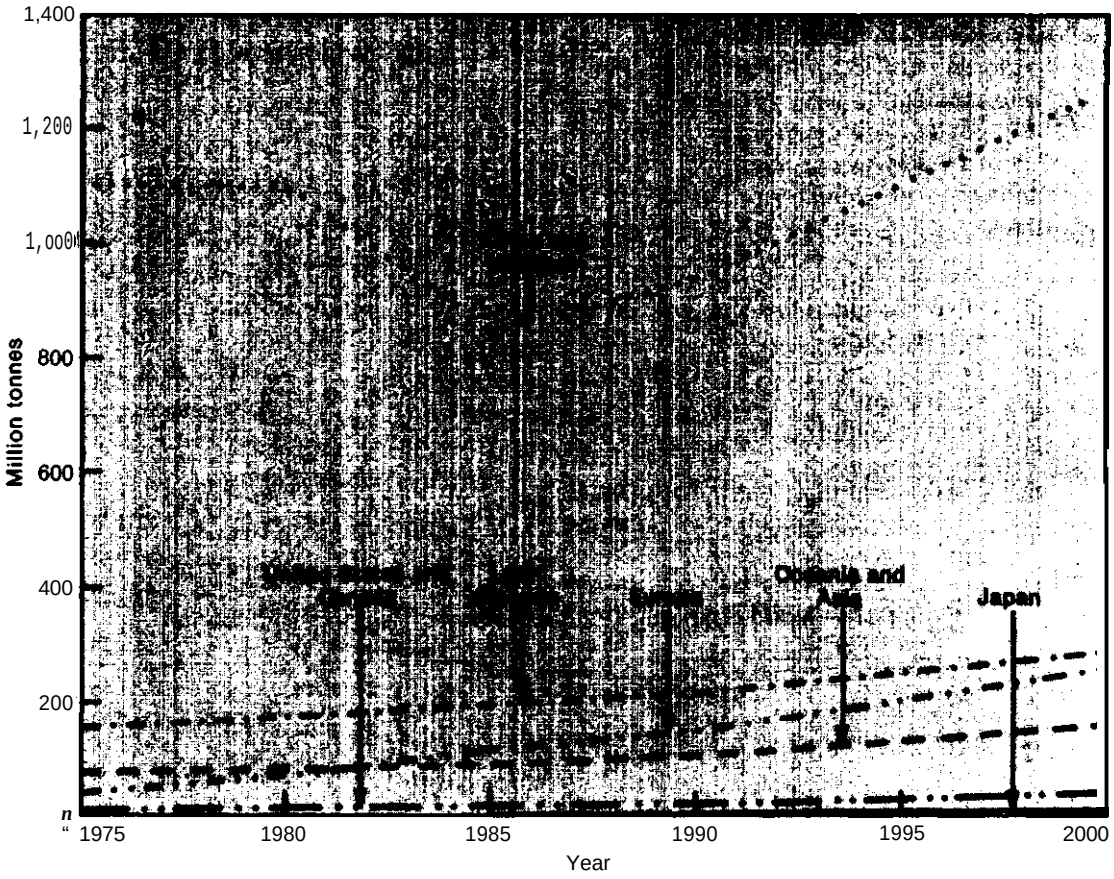
In liquid-bulk exports (fig. 18), this outlook suggests that the Middle East share will decline to 1985 due to generalized world recession, the oil glut's effects on Persian Gulf suppliers' shares, and the culmination of major non-OPEC oil and gas substitution efforts involving Mexico, the U. S. S. R., the United Kingdom, and the Alaskan slope. In spite of this decline, however, the Middle East will continue to dominate world petroleum exports with over 50 percent of the trade. After 1985, the Middle East share is expected to stabilize, as world energy conservation slows and Middle East petroleum product shares grow based on the industry developments in the early 1980's. Latin America and Africa appear to remain the major secondary petroleum exporting regions, with Latin America

Figure 17.-World Seaborne Dry-Bulk Imports, Regional Distribution



SOURCE: Wharton Econometrics, Inc.

Figure 18.—World Seaborne Liquid-Bulk Exports, Regional Distribution



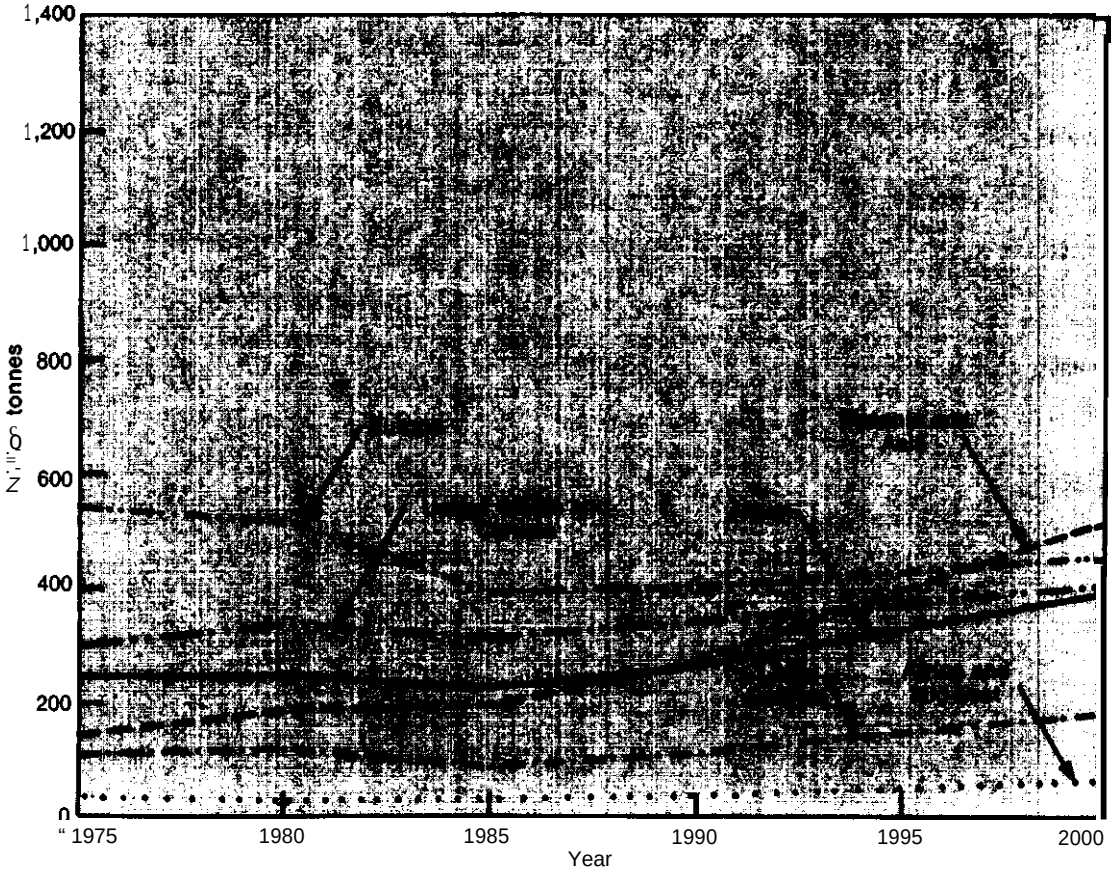
SOURCE: Wharton Econometrics, inc.

overtaking Africa after 1985. This forecast assumes, of course, that the real price of energy falls until 1985 **and** rises modestly thereafter. **It** also implicitly assumes no significant Middle-East supply interruptions and steady use of new supplies from the non-OPEC world.

Imports of liquid-bulk (primarily petroleum) cargoes are more evenly distributed than exports, and some shifts are expected over the next two decades, as seen in figure 19. South Asia's share is likely to grow very rapidly, shown here **as** doubling between 1980 and 2000. U.S. and, particularly, European shares decline. Japan, due to its large dependency on oil with few alternatives that could be landborne, as is the case for the United States (coal, gas pipelines) and Europe (gas pipelines from the U.S.S.R.), is expected to have an increasing share of petroleum imports.

The pattern of relatively high growth of South Asian trade is repeated for exports of general cargo, as seen in figure 20. The newly industrializing countries of South Asia are joined in growth by the industrializing countries of Mediterranean Europe. The U.S. share declines. In this outlook, Northern Europe's share is level to 1990, and thereafter falls swiftly. Such a projection is based on combined assumptions of a more realistically valued U.S. dollar, tired European industries, growing intra-Europe trade with the Mediterranean and CPE countries, and structural shifts toward service industries that make Northern European countries the leading examples of postindustrial societies.

Figure 19.—World Seaborne Liquid-Buik imports, Regionai Distribution



SOURCE: Wharton Econometrics, Inc.

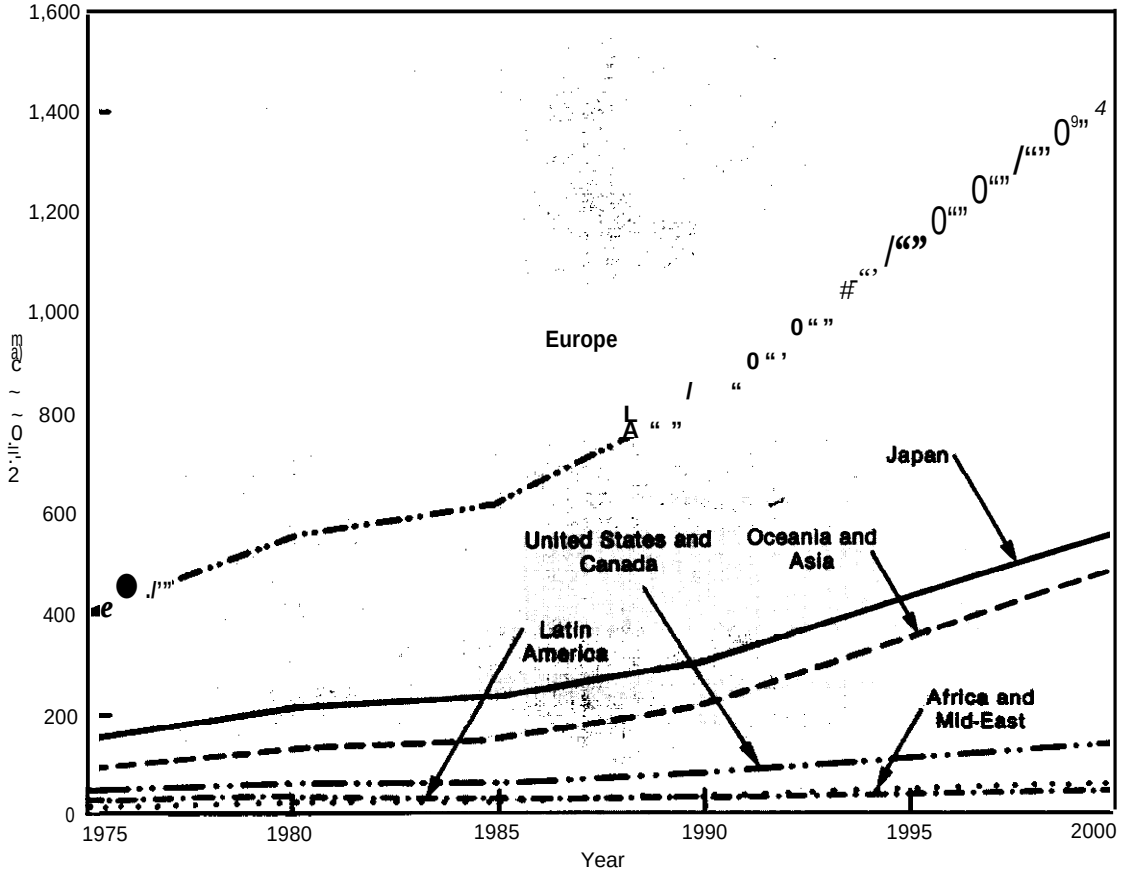
Imports of general cargo are more evenly distributed than the other commodities (fig. 21). While no dramatic shifts are predicted in this growing trade, the largest increases by 2000 are anticipated in the shares going to Japan and South Asia.

In summary, for the particular Wharton base-case-economic outlook discussed at the beginning of this section, world seaborne-trade tonnages are predicted to grow by compound rates of 3.9, 1.6, and 5.4 percent for dry-bulk, liquid-bulk, and general cargo, respectively, from 1980 to 2000. Economic growth and industrialization in South Asia is reflected in rapidly growing shares of imports, especially in exports of general cargo, and in expansion of liquid-bulk imports. In the dry-bulk trades, U.S. and European shares of exports are expected to increase while shares of imports decline.

U.S. Trade Patterns and Networks

The total tonnages of U.S. seaborne trade in the three commodity sectors from 1975 projected to 2000 are shown in figure 22, including both imports and exports. In 1980 the greatest tonnages were in imports of petroleum and dry-bulk exports. Due to current and projected low growth rates for the oil trade, it is far outstripped by exports of dry-bulk cargoes as the largest sector in this forecast. The trends in dry-bulk imports contrast with the other trades. Between 1975 and 1980 dry-bulk imports declined while the other sectors were expanding. While the outlook indicates that growth in all other trades is lower currently (1980-85) than during the previous 5 years or projected to 2000, dry-bulk imports are shown to have their best growth during the current interval. The dry-bulk sector as

Figure 20.—World Seaborne Generai Cargo Exports, Regionai Distribution



SOURCE: Wharton Econometrics, Inc.

a whole would grow from 49 to 59 percent of the total U.S. maritime trade between 1980 and 2000, while liquid-bulk would decline from 40 to 28 percent.

Overall, the forecast predicts that from 1980 to 2000 U.S. shipborne exports of dry-bulk, liquid-bulk, and general cargo will grow 4.4,6.4, and 3.9 percent per annum, respectively. U.S. imports of the same cargo types are projected to grow at 2.4, 0.9, and 3.7 percent, respectively.

Figures 23 through 25* show the current and forecast geographical distribution of seaborne trade of the United States derived from the data created by Wharton.

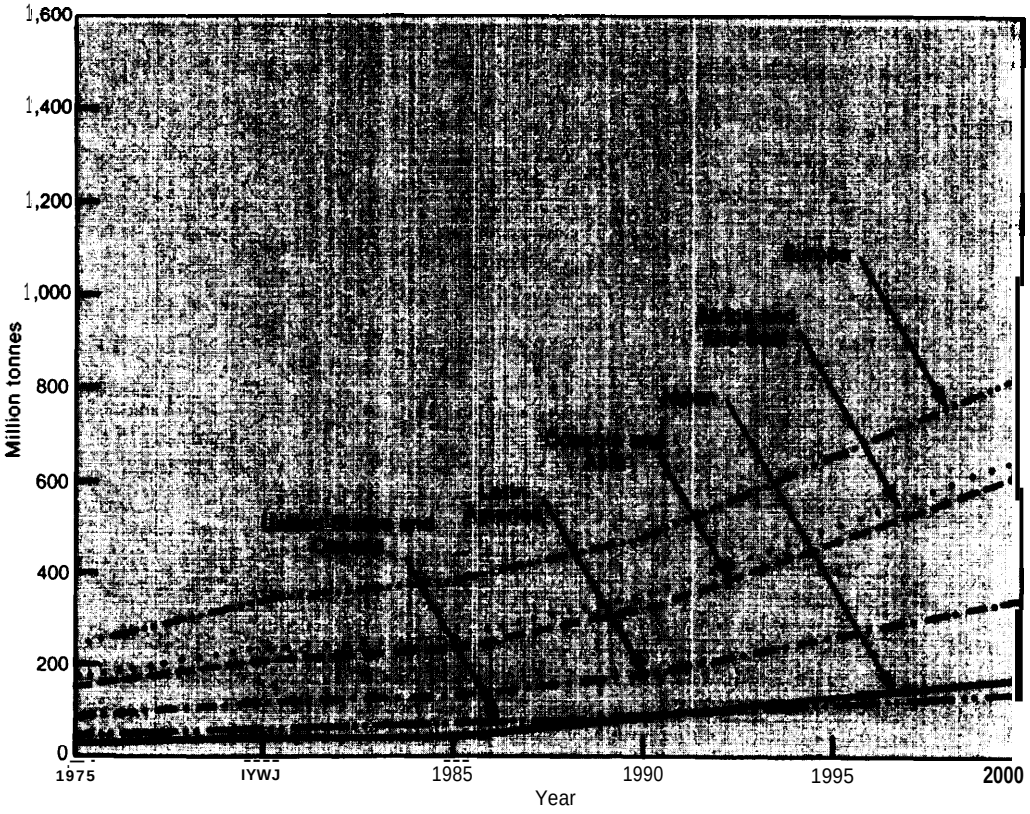
● For figs. 23 through 25, showing the regional distribution of U.S. **seabome trade,** the regions are the same as for the world figures, ***except*** that Japan has been included in the Asian region.

In the dry-bulk category, exports to LDCS grow steadily as a share. Among the developing areas, South Asia's share expands most rapidly. The coal trade with Europe grows, but the grain trade appears to decline, lowering the share of dry-bulk trade to that region overall. Almost no growth occurs in the volume of dry-bulk exports to Europe until after 1985.

For **U.S.** imports, this outlook shows Africa's and Latin America's dry-bulk shares progressively declining as industrialization catches up with their interest in commodity exports. Europe's share of our dry-bulk imports appears to increase between 1980 and 1985 due to the strong dollar problem as well as their new strength in agricultural goods.

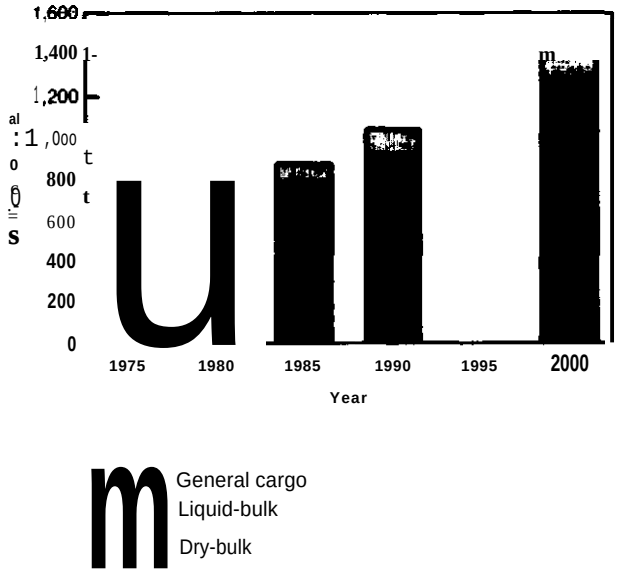
In the small U.S. liquid-bulk (petroleum) export trade, the major projection is for a jump in the

Figure 21.—World Seaborne General-Cargo Imports, Regionai Distribution



SOURCE: Wharton Econometrics, Inc.

Figure 22.—U.S. Seaborne Trade



SOURCE: Wharton Econometric Forecaatlng Associates.

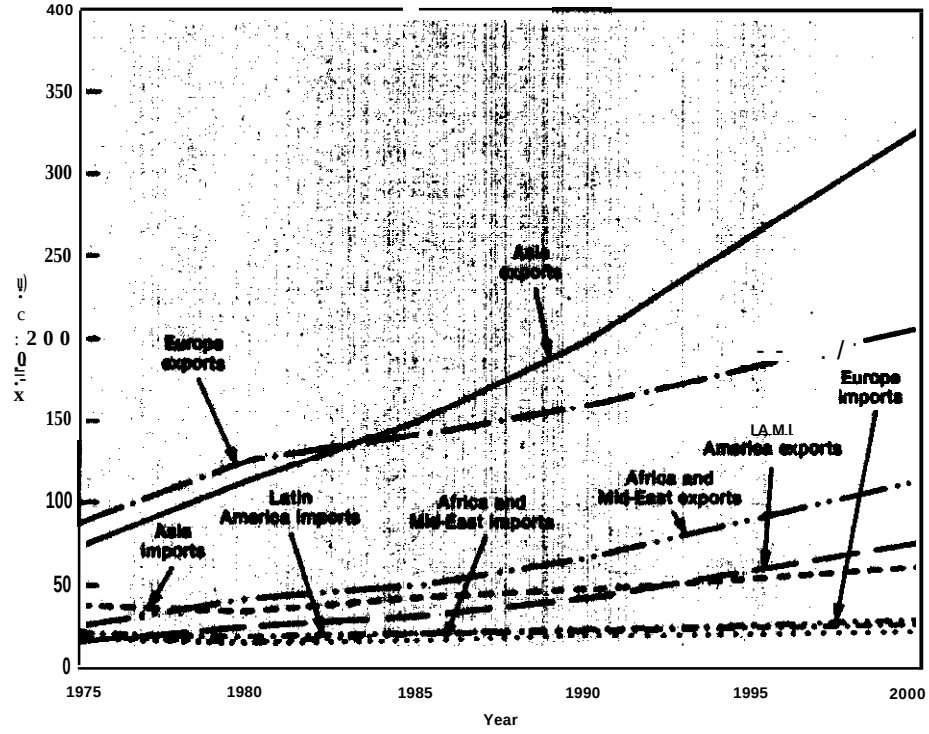
shares going to Japan and South Asia showing up in 1985, associated with petroleum developments in Alaska.

In the fuels-import trade, it is anticipated that Latin American, African, and Middle Eastern sources decline significantly while imports from Europe increase between 1980 and 1985. Beyond 1985, growth is likely in imports from each of those regions. The rate of growth in European imports is projected to slow.

In the general cargo trade, exports in the current period remain level or decline slightly. Thereafter, there are significant projected increases in volume to Europe, Asia, and Japan.

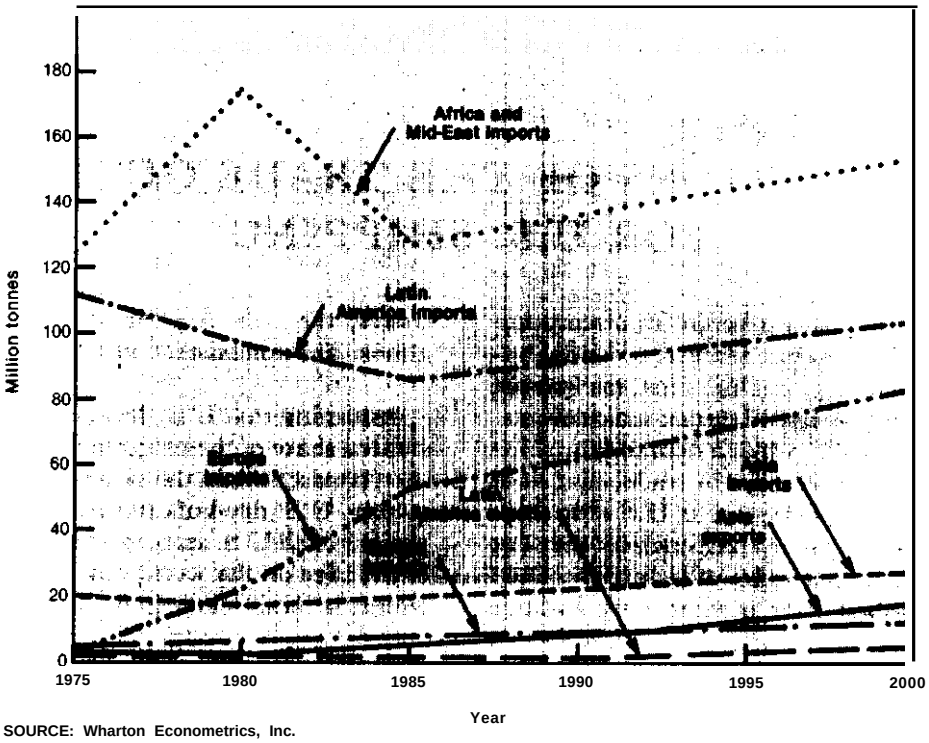
U.S. general cargo imports tend to follow world export share developments. The South Asia region is expected to displace all others after 1990 to emerge by 2000 as the most important supplier, supplanting Japan and Europe.

Figure 23.—U.S. Seaborne Dry-Buik Trade, Regionai Distribution



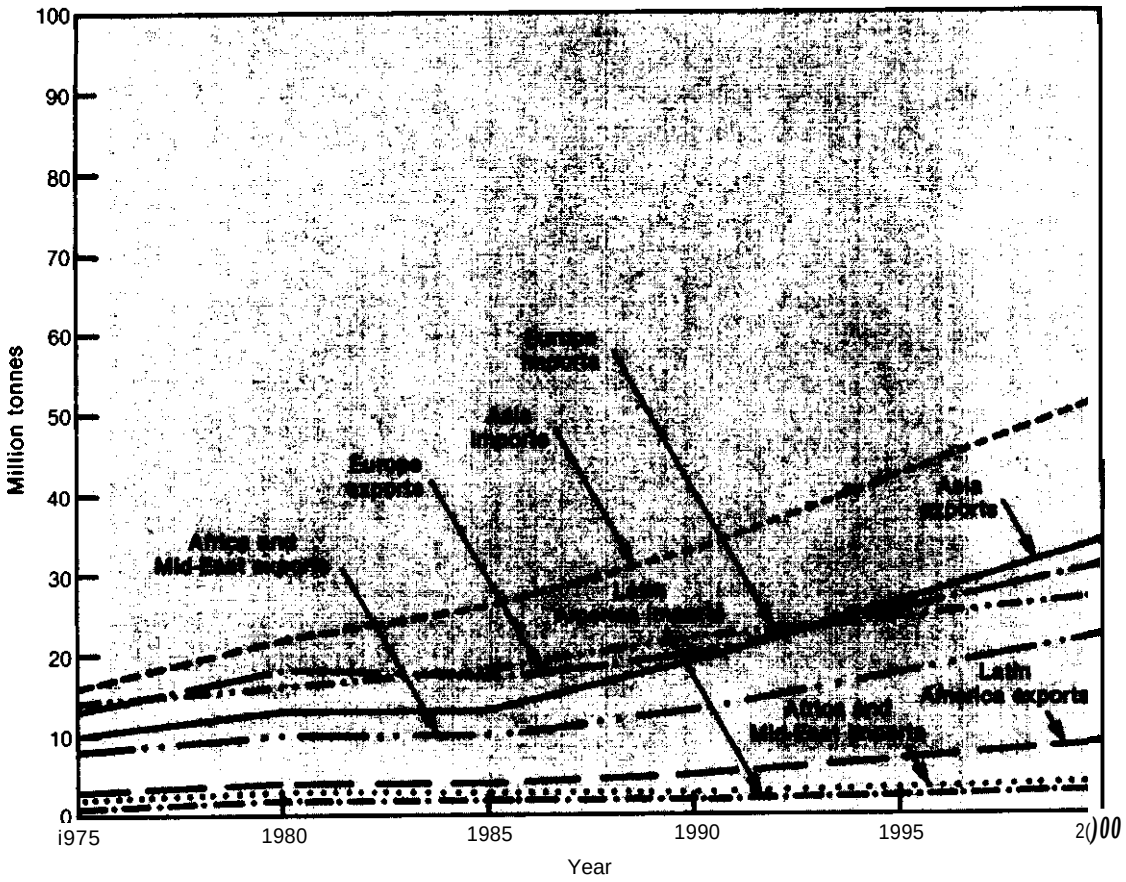
SOURCE: Wharton Econometrics, Inc.

Figure 24.—Seaborne Liquid-.Buik Trade, Regionai Distribution



SOURCE: Wharton Econometrics, Inc.

Figure 25.—U.S. Seaborne General Cargo Trade, Regional Distribution



SOURCE: Wharton Econometrics, Inc.

IMPLICATIONS OF THE TRADE OUTLOOK FOR U.S. SHIPPING

There are several risks inherent in attempting to project from an economic forecast potential opportunities for U.S.-flag shipping. First, the forecast itself may not have anticipated certain major events. Second, if it is accurate, while a demand for ships will be created by an increase in trade, that does not necessarily mean an increase in U.S.-flag shipping. U.S. carriers must be competitive if they are to capture a meaningful share of U.S trade. Currently they maintain such a share only in liner trades; the U.S.-flag liquid- and dry-bulk fleets almost are nonexistent in foreign trade.

Assuming that U.S.-flag ships will carry a substantial share of the projected trade, opportunities should exist both in the general cargo and dry-bulk sectors. U.S. dry-bulk trade will rise from 49 to 59 percent of all U.S. seaborne trade. The current glut of tonnage on the world market should disappear within several years. U.S. trade with developing

countries will rise, particularly in the South Asia region. Ships clearly will be required. However, the real question is whether U.S.-flag carriers will begin to share in the carriage of our dry-bulk trade. It is unlikely that this will occur without major competitive or policy changes.

In the liquid-bulk sector, few opportunities will exist. Trade will rise only moderately through 2000, and the already overtonnaged market is expected to continue for the foreseeable future. Here, as in the dry-bulk markets, the U.S.-flag fleet has been unsuccessful in capturing more than a tiny fraction of U.S. trade in the past.

Future trade growth in the general cargo area could be significant. U.S. exports over the long term are expected to increase to Europe, Asia, and Japan, while South Asia will predominate in the U.S. import trade. Replacements will be needed for older, inefficient U.S.-flag liner vessels, and new capacity will be needed. However, this may not translate into substantial additional numbers of new ships because the newer generation of container ships are massive, suited for high-capacity service. Liner operators will need to restructure their fleets to accommodate the shifting trading patterns.

Finally, long-term trade projections only are useful in a policy sense if they are used as one of the tools in anticipating future needs and opportunities. When major policy changes are proposed, as they have been recently, it is important to determine if the policies are addressing future situations clearly. Forecasting is very difficult, but it is also very necessary for informed action. The development of maritime policy would be enhanced by access to current trade forecasts that take into account a coherent global view of trading relationships and that are simple and flexible enough to be continually matched to changing conditions in the world and in the United States. At present, the Federal Government does not maintain accurate and current maritime trade data and forecasts. The U.S. Government collects and stores monumental quantities of commodity import and export data, but to obtain information relevant to world trade and shipping, we must rely on such countries as Norway and the United Kingdom for timely, quality statistics and analyses.