U.S.-JAPAN TRADE IN CONSTRUCTION

by

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ABSTRACT

The Japanese construction materials industry has been suffering from the world-wide recession, fierce international competition, and sluggish domestic construction activities. Historically, Japanese construction material manufacturers have competed with other countries internationally and have had few imports in their domestic market. Therefore, there is no idea of integrated market of domestic production with imports in the Japanese construction materials industry right now. However, the structure of the Japanese construction materials industry will change rapidly in the next decade, following the increased foreign pressure to open Japan's domestic market and the rapid appreciation of the Japanese yen. The Japanese construction materials industry will have to face growing imports in their domestic market in the future.

This thesis presents a historical lesson, based on what the U.S. construction materials industry is experiencing now, compared to the present condition of the Japanese construction materials industry. In this way it will outline the potential for an integrated construction materials industry with imports in Japan. To this end, the thesis first presents a general view of the international trade of both countries, explains construction activity in both countries; examines the individual construction material market in the U.S. and Japan; and finally, presents ways to integrate the U.S. and Japanese construction materials industries through imports in the future.

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Chapter 1 Introduction

Although there are quite a few studies of the international construction industry in general, few studies of international trade in construction materials and its impact on the international construction industry have been carried out. According to input-output tables published by the U.S. and Japanese governments, about one-third of total construction investment goes to construction materials. As a result of the increased number of international construction projects, it has become very important to know which portions of construction investment are tradeable particularly between developed countries.

After World War II, international construction became very active in the construction industries of developed countries, due to advanced technologies at home and increased construction demand abroad. Along with this internationalization process, construction materials and machinery industries became international. However, until recently, internationalization of these industries has more or less followed the internationalization of domestic construction industries. Certain characteristics of construction materials, such as bulky, heavy weight, and low value, prevented some construction materials from becoming profitable trade goods. Clearly, they could not be distributed profitably on a global scale. Very few construction materials were traded internationally in great volume before the 1970s.

In the current study, two different types of international construction projects have been observed in terms of the gravity of their effects on the economies of the contractors' home countries. These projects take place in (1)developing countries and (2) developed countries. Typical international construction projects in developing countries are those in which contractors bring with them technology, know-how, management, capital, and materials required for projects. In extreme cases, contractors have had to supply labor (skilled and unskilled). On the other hand, contractors bring only their technology, know-how, and management in the second type of international construction which takes place in developed countries. Materials and laborers are available in developed countries. The activity of international contractors in developed countries can be defined as belonging to the service sector of each economy, because the activity area is generally confined to feasibility study, financing, consulting, and project management.

International construction in developing countries is now gradually decreasing because of the money shortage and the political instability of many of these countries. However, international construction in developed countries, especially in the U.S., is increasing due to economic activity and fierce competition among international contractors seeking a new market to substitute for the sluggish market in developing countries.

International construction in developing countries has

had a strong effect on the economy of the contractors' home-countries, because such project creates an additional demand for the products of domestic construction materials and machinery industries. One study suggests that about 50 percent of the contract price of projects in developing countries was returned to the home economy of contractors, primarily because of the contractors' preferences for home-country materials [1]. This situation is changing rapidly because of the globalization of the construction industry and because of international contractors' new strategy which pursues international procurement. Given the fact that an international contract will not supply additional demand for the home economy, construction materials and machinery industries have to play an active role in their internationalization if they want to continue to grow.

The U.S. has been the largest and most active construction market in the world. International contractors and construction materials manufacturers have been trying to penetrate the U.S. market. International trade of construction materials in the U.S. became very active in the latter half of the 1970s, when a flood of construction materials imports was first reported. The flood of construction materials imports has had two meanings for the U.S. economy. First, the American construction materials industry suffers when it has to compete with low-priced imports. Second, and paradoxically the construction industry in the U.S. is taking advantage of low-priced materials. Although Japan's const-

ruction materials market is not yet open to foreign manufacturers, it soon will be.

This thesis reviews construction materials and machinery shipments, international trade, and domestic consumption in the U.S. and Japan. This study investigates the activity and role of the construction materials and machinery industries in relation to the construction industry in the two countries. Chapter 2 gives readers to a general outline of the international commodity trade of each country. Chapter 3 examines the role of the construction industry in the economy of each country. Chapter 4 describes the construction material market in the United States, with example such as cement, steel, and glass. Chapter 5 describes its Japanese counterpart. In Chapter 6, as a conclusion, this thesis presents a possible strategy for the future survival of the construction materials and machinery manufacturers in these two developed countries.

Chapter 2 International merchandise trade of the U.S. and Japan.

The U.S. and Japan, the two most developed countries in the world, have had a long economic relationship, lasting since World War II. In the 1980s, each country is the other's biggest trade partner; however, the two countries have different patterns of international trade. This chapter gives a general view of the international trade of both countries.

2-1 History of the international merchandise trade in the two countries after World War II

The total Japanese exports and imports for the past 30 years are shown in Table 2-1. This table shows that Japan's total exports grew from 724 billion yen ($ 2.01 billion)1/ in 1955 to 41,956 billion yen ($ 175.89 billion) in 1985, and that imports grew from 890 billion yen ($ 2.47 billion) to 31,085 billion yen ($ 130.31 billion) in the same period. Meanwhile, the share of Japanese exports in world exports increased from 1.6 percent in 1953 to 8.9 percent in 1984, and its share of world imports increased from 2.9 percent in 1953 to 6.7 percent in 1984 (Table 2-3, 2-4). These numbers show constant Japanese trade growth in the world economy. During the same period, United States exports increased from

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1/ Exchange rate : $ 1 = 360 yen in 1955
$ 1 = 238.54 yen in 1985
For detailed information about the yen-dollar exchange rate, see Table B-1 in the appendix.

15.553 billion dollars to 213.146 billion dollars; however, its share in the world exports decreased from 19.0 percent in 1953 to 11.4 percent in 1984 (Table 2-2, 2-3). Imports grew from 11.562 billion dollars to 361.626 billion dollars and the share increased from 12.9 percent to 17.1 percent in the same period (Table 2-2, 2-4).

Table 2-1

Total value of Japanese exports and imports

billion yen

Year	Exports	($ billion)	Increase in 5 years	Imports	($ billion)	Increase in 5 years
1955	724	(2.0)		890	(2.5)	
1960	1,460	(4.1)	102%	1,617	(4.5)	82%
1965	3,043	(8.4)	108%	2,941	(8.2)	82%
1970	6,954	(19.3)	129%	6,797	(18.9)	131%
1975	16,545	(55.8)	138%	17,170	(57.9)	153%
1980	29,382	(129.6)	78%	31,995	(141.1)	86%
1985	41,956	(175.9)	43%	31,085	(130.3)	- 3%

Note : See Table B-1 in the appendix for the exchange rate.
Source : [2]

Table 2-2

Total value of U.S. exports and imports

billion dollars

Year	Exports	Increase in 5 years	Imports	Increase in 5 years
1955	15.553		11.562	
1960	20.600	32%	15.072	30%
1965	27.521	34%	21.520	43%
1970	42.659	55%	39.951	86%
1975	107.652	152%	98.503	147%
1980	220.630	105%	244.871	149%
1985	213.146	-3%	361.626	48%

Source : [3],[4]

Table 2-3

Share of world exports by country

1953		1963		1973		1984	
Area	%	Area	%	Area	%	AREA	%
World	100.0	World	100.0	World	100.0	World	100.0
U.S.	19.0	U.S.	14.9	U.S.	12.2	U.S.	11.4
U.K.	8.7	U.K.	9.4	F.R.Germ.	11.7	F.R.Germ.	8.9
F.R.Germ.	5.7	F.R.Germ.	7.9	Japan	6.4	Japan	8.9
Canada	5.1	France	5.2	France	6.3	U.K.	4.9
France	4.8	USSR	4.7	U.K.	5.3	France	4.9
USSR	3.5	Canada	4.2	Canada	4.4	USSR	4.8
Bel.-Lux.	2.8	Japan	3.6	Netherlan	4.2	Canada	4.4
Netherlan	2.7	Italy	3.3	Blg.-Lux.	3.9	Italy	3.8
Australia	2.4	Netherlan	3.2	Italy	3.9	Netherlan	3.4
Brazil	1.8	Blg.-Lux.	3.1	USSR	3.7	Bel.-Lux.	2.7
Italy	1.8	Sweden	2.1	Sweden	2.1	Saudi Ara	2.1
Sweden	1.8						
Venezuela	1.8						
Japan	1.6						
Others	36.5		38.4		35.9		39.8

Source : [5]

Table 2-4

Share of world imports by country

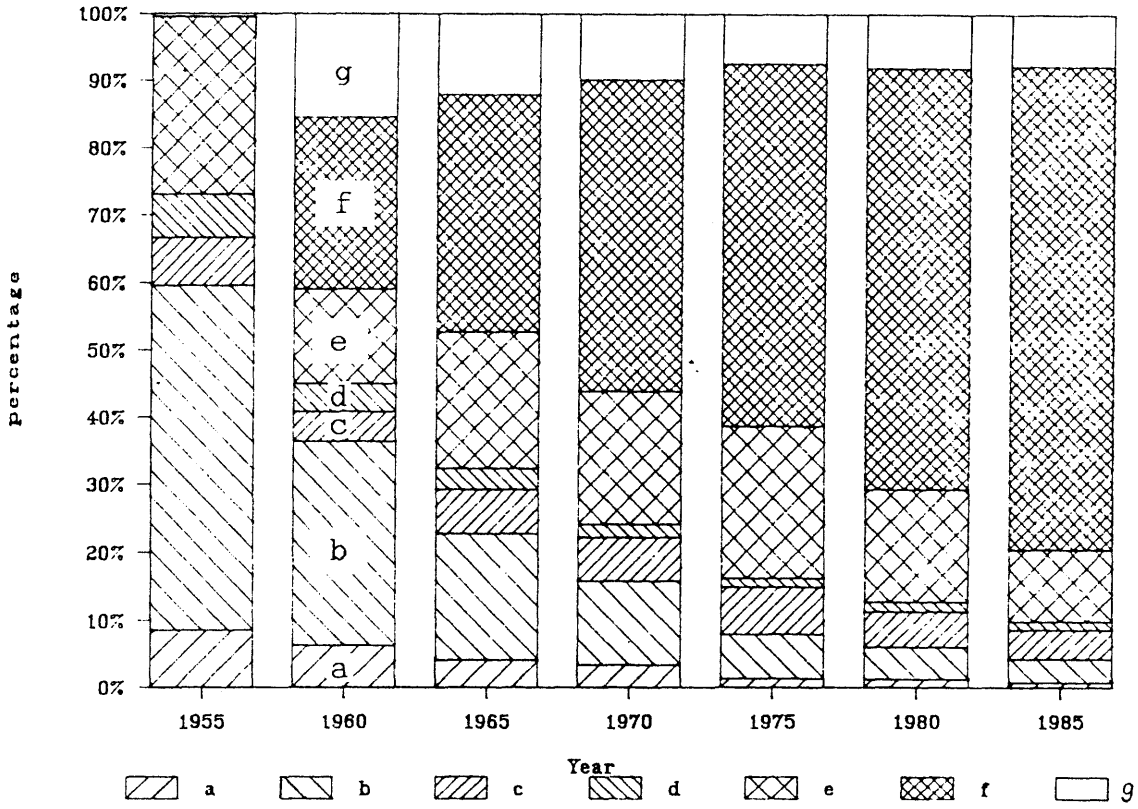
1953		1963		1973		1984	
Area	%	Area	%	Area	%	Area	%
World	100.0	World	100.0	World	100.0	World	100.0
U.S.	12.9	U.S.	10.5	U.S.	11.6	U.S.	17.1
U.K.	10.7	U.K.	8.6	F.R.Germ.	9.2	F.R.Germ.	7.6
Canada	5.1	F.R.Germ.	8.0	U.K.	6.6	Japan	6.7
France	5.0	France	5.3	Japan	6.5	U.K.	5.3
F.R.Germ.	4.9	Italy	4.7	France	6.3	France	5.2
USSR	3.4	USSR	4.4	Italy	4.7	Italy	4.1
Italy	2.9	Japan	4.1	Netherlan	4.1	USSR	4.0
Bel.-Lux.	2.9	Canada	3.7	Canada	3.9	Canada	3.8
Japan	2.9	Netherlan	3.7	Bel.-Lux	3.7	Netherlan	3.1
Netherlan	2.9	Blg.-Lux.	3.1	USSR	3.6	Bel.-Lux.	2.7
Sweden	1.9	Sweden	2.1	Switzer.	2.0	Saudi Ara	1.7
Others	44.5		41.8		37.8		38.7

Source : [5]

A structural change in the Japanese international merchandise trade between 1955 and 1985 can be seen in Figure 2-1 and Figure 2-2. This change also reflects structural change in the manufacturing industry in Japan. In the 1950s, light industries such as textiles shared the greatest part of Japanese exports, but in the 1960s heavy industries such as metal products, machines and equipment emerged to dominate Japanese exports in the 1970s and 1980s.

Figure 2-1

Export structure of commodity groups in Japan

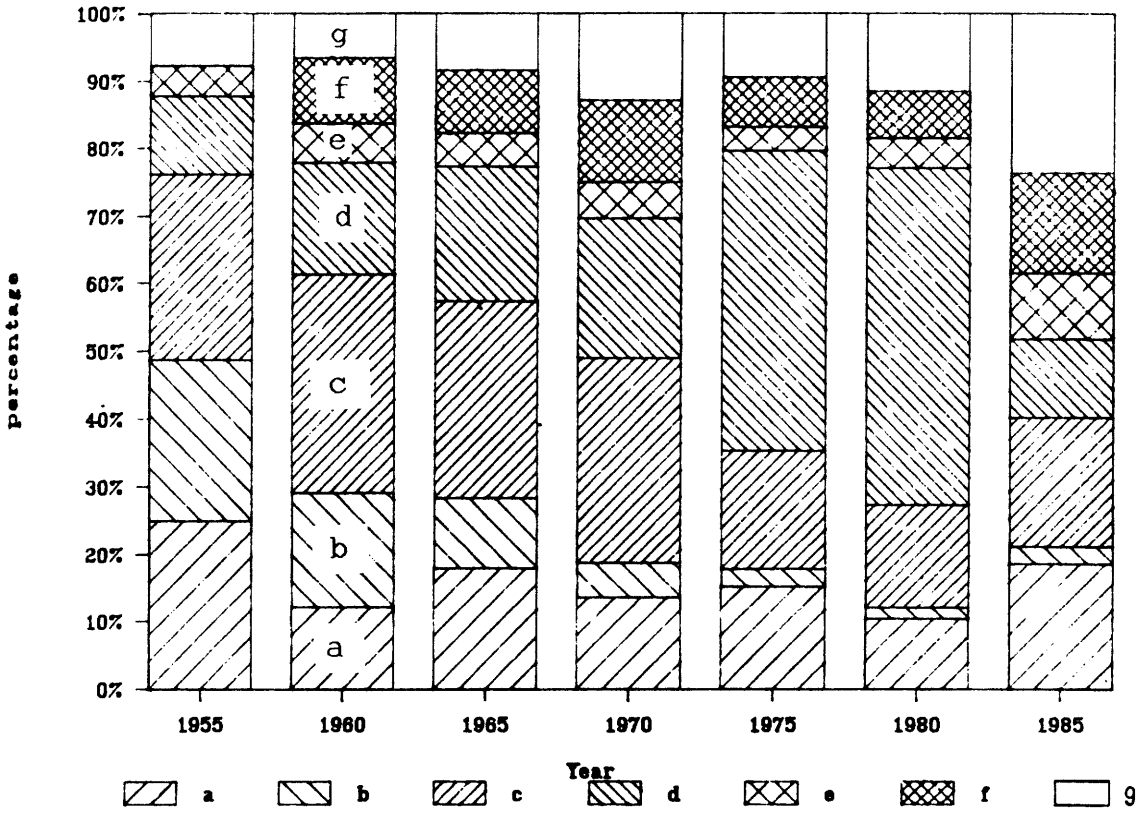


a: Foodstuffs
b: Textiles
c: Chemicals
d: Non-metallic mineral products
e: Metals and metal products
f: Machinery and equipment
g: Others

Source : [2]

Figure 2-2

Import structure of commodity groups in Japan



a: Foodstuffs
b: Textile material
c: Metallic and Raw materials
d: Mineral fuels
e: Chemicals
f: Machinery and equipment
g: Others

Source : [2]

Following the devastation of the economy in World War II, the Japanese government and businesses rushed into industrialization based on an export-oriented policy. Because the United States has been Japan's main trading

partner and the wealthiest country in the world, the Japanese export structure and total industrial structure were determined by the spectacular profits to be made in the United States import market. For the past 30 years, this industrial structure was supported by large corporations and by the Japanese government. In the 1950s and 1960s, the Japanese government allocated resources, which had been scarce during the immediate post-war period, to the sectors of the economy regarded as future exporters. Carefully arranged import barriers worked effectively to protect domestic industries.

By comparison, after World War II, the United States had a mature industrialized economic structure, including an export structure that has remained stable until now. However, the imports structure has changed dramatically even in this decade (Table 2-5). While agricultural and mineral fuels imports have only doubled in ten years, imports of manufactured goods have increased nearly five-fold.

About five percent of the United States exports went to Japan in 1955, and exports to Japan grew to 10.6 percent of the U.S. exports in 1985. By comparisons, the U.S. imports from Japan grew from 3.9 percent to 20 percent of the U.S. total imports during the same period.2/ The role of Japan in the U.S. international trade became very important recently. Moreover, gradually following the general change in its international trade pattern, the U.S. changed from a net

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2/ The numbers for 1955 come from a combination of Japanese statistics and the U.S. statistics.

exporter to a net importer with Japan following the international trade pattern.

Table 2-5

U.S. merchandise trade by major products
(Domestic and foreign exports, f.a.s.;
general imports, c.i.f.)

million dollars

Exports	Total	Agricultural	Mineral fuel	Manufacturer	Others
1975	108,113	22,097	4,481	75,350	6,185
1976	115,413	23,281	4,228	81,302	6,602
1977	121,294	24,234	4,204	85,917	6,939
1978	143,766	29,777	3,946	101,474	8,569
1979	182,025	35,213	5,677	128,170	12,965
1980	220,786	41,757	8,154	155,808	15,067
1981	233,649	43,814	10,317	166,849	12,669
1982	212,275	37,010	12,777	151,264	11,224
1983	200,538	36,454	9,639	143,495	10,950
1984	217,888	38,231	9,481	158,449	11,727
1985	213,146	29,632	10,102	161,974	11,438
Imports	Total	Agricultural	Mineral fuel	Manufacturer	Others
1975	105,880	10,333	28,284	57,691	9,572
1976	132,498	12,143	36,362	72,216	11,777
1977	160,411	14,555	47,293	85,224	13,339
1978	186,045	16,145	44,722	110,889	14,289
1979	222,228	18,249	63,800	123,755	16,424
1980	256,984	18,878	82,364	138,780	16,962
1981	273,352	18,807	84,441	156,351	13,753
1982	254,885	17,286	67,657	158,114	11,828
1983	269,878	18,102	60,215	178,475	13,086
1984	341,177	21,582	63,297	241,790	14,508
1985	361,626	22,019	55,843	269,364	14,400

SOURCE : [6]

According to Japanese government statistics, the United States' merchandise trade deficit with Japan began in 1965 [2]. These statistics show that the United States had a trade surplus once in 1965, but never again since then. The latest statistics in the United States show that the U.S. trade deficit became $21,665 million, $36,796 million, and $49,749 million in 1983, 1984, and 1985 respectively [6]. The shift of Japan's total international trade from a deficit to a surplus occurred in the latter half of the 1960s. The change from a surplus to a deficit in U.S. trade began in the first half of the 1970s. During that period, the main trade deficit of the U.S. was attributed to deficits with Japan and Canada [3]. In 1985, the United States registered a $148,480 million trade deficit, and one-third of it came from the deficit with Japan.

2-2 Review of the trade problem

After World War II, the United States had the most free international trade policy among developed countries. At this time, Japan had one of the most protected domestic markets among the industrialized countries. Imports from other countries were controlled by Japanese regulations and authority. The Japanese government wanted to save available resources and to concentrate them into the industries that would become exporters, employ 100 million people directly and indirectly, and raise the standard of living in Japan to that of Europe and America. For example, the share of

consumer goods (except food) in total Japanese imports was 1.4 percent in 1963 and 4.8 percent in 1985, while that of the U.S. was 16 percent in 1960 and 33 percent in 1983 [2],[6]. These figures show that Japan concentrated more on intermediate and capital goods than on consumer goods, as compared to the U.S.

The reason why Japanese imports of consumer goods have remained such a low percentage of the total imports cannot be explained by tight government control. Because the Japanese government had controlled imports so effectively, the consumer goods remained a small fraction of total imports during the post-war period. However, even since the tight control has been lifted, the share of consumer goods imports has remained small. One of the reasons is that the Japanese officials have programmed a schedule for loosening the import controls so carefully that the result has not been as fruitful as the foreign countries expected. The second reason is that Japanese culture values saving, which suppresses the demand for import goods. In order to examine how two countries control trade, it is necessary to examine the condition of trade barriers in those two countries.

2-2-1 Overt protection

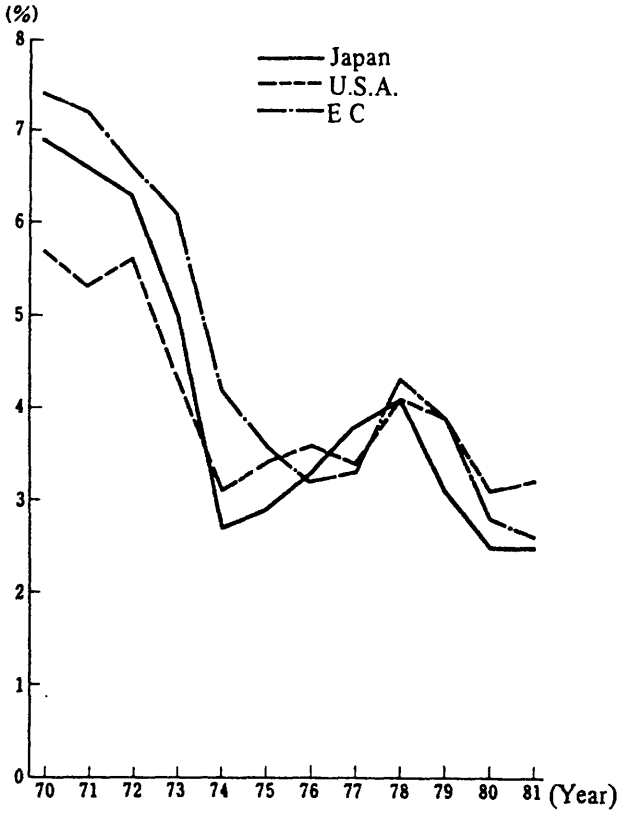
i) Tariffs

Traditionally, tariffs have played an important role in protecting the domestic market. Foreign governments and businesses criticized the high Japanese tariffs in the 1970s.

Japan tried to reduce friction over international trade by slashing import tariffs an average of up to three percent in early 1985 [7]. This figure, compared to that of the U.S. and the EC, makes Japanese tariffs among the lowest in the world. It is very difficult to figure out what the actual average tariff is, because it varies according to the condition of each country's import pattern and its import control. One example of how each country's tariff works is shown in Figure 2-3. This figure shows the actual burden of imports for each country or area. According to this figure, the Japanese tariff became equal to or lower than that of the United States in the mid-1970s. (The rate of tariff burden can be changed greatly by quotas, freight and insurance costs, and patterns of import category; therefore, the rate of tariff burden cannot be a true variable of tariffs. However, it does give us some information about tariffs.)

Figure 2-3

Rate of burden of tariff in Japan, the U.S., and EC.



note : Rate of tariff burden = $\frac{\text{Value of tariff revenue}}{\text{Total value of imports}}$

Source : [8]

Cline [9] examined the two countries' average post-Tokyo Round tariff rates and concluded that although the high tariff rate does remain high in some politically sensitive categories, tariffs are no longer the dominant form of protection, and their average level is low in both the United States and Japan (Table 2-6).

Table 2-6

Average tariffs in the United States and Japan, post-Tokyo Round rates

percentage

	U.S.	Japan
Industrial products		
GATT definition		
W	4.4	2.8
S	6.3	6
UN definition		
W	4.6	6.8
Raw materials		
W	0.2	0.5
S	1.8	1.4
Semi-manufactures		
W	3	4.6
S	6.1	6.3
Finished manufactures		
W	5.7	6
S	7	6.4
Selected product sectors		
3112 Dairy	7.4	32.9
3113 Preserved fruits and vegetables	10	19.5
3211 Textile spinning	11	5.6
3212 Made-up textiles	19.6	12.4
3213 Knitting	14.4	12.5
3214 Carpets, rugs	6.4	11.3
3220 Apparel	22.4	13.9
3233 Leather products	13.4	11.1
3240 Footwear	9	11.6
3559 Rubber products n.e.c.	12.1	11.6
3620 Glass	10.5	5.1
3691 Clay	15.9	3.6

Note: W= import-weighted average; S=simple average

Source : [9]

ii) Non-tariff barrier (quotas)

Non-tariff barriers became the most important form of protection after the tariffs in the two countries became low. Non-tariff barriers include import quotas, so-called voluntary export restraints, orderly marketing arrangements, discretionary licensing, and state trading.

Historically, Japan has had a large number of import controls. However, the number of import quotas gradually diminished until the early 1970s and by 1985 there were quotas for only 22 items, of which 21 were agricultural products and the remaining one was coal (Table 2-7). Because of the political influence of the agricultural sector in Japan, the government has retained the quotas of agricultural product imports. Some countries are asking Japan to open its agricultural product market in order to reduce its trade surplus. Their argument used to be that quotas were the main barrier to Japanese imports, but the Japanese trade surplus has become so large that agriculture imports increased by the liberalization of the Japanese market can no longer offset the imbalance.

The United States, like Japan, has various quotas in many product areas, such as dairy products, animal feeds, cotton, cotton waste, stainless steel bars, textile articles and wearing apparel, peanuts, sugar, syrup, molasses, cheese, and some beer and wine [7].

Table 2-7 Japanese import quotas, 1962-1986
(Total number of 4-digit BTN categories subject to any quota restrictions)

	Unliberalized import item	Residual import quota item	Of which	
			Industrial products	Agricultural products
Apr. 1962	492	453	n.a.	n.a.
Apr. 1965	162	123	n.a.	n.a.
Apr. 1968	165	122	54	68
Apr. 1969	163	120	52	68
Oct. 1969	161	118	50	68
Feb. 1970	152	109	45	64
Apr. 1970	141	98	39	59
Sep. 1970	133	90	35	55
Jan. 1971	123	80	31	49
Jun. 1971	106	60	20	40
Oct. 1971	87	40	12	28
Feb. 1972	86	40	12	28
Apr. 1972	79	33	9	24
Apr. 1973	83	32	8	24
Nov. 1973	82	31	8	23
Jun. 1974	85	31	8	23
Oct. 1974	84	30	8	22
Dec. 1974	83	29	7	22
Apr. 1975	84	29	7	22
Dec. 1975	82	27	5	22
Apr. 1977	80	27	5	22
Apr. 1978	79	27	5	22
Aug. 1979	80	27	5	22
Jan. 1980	73	27	5	22
May 1980	78	27	5	22
Dec. 1981	79	27	5	22
May 1984	80	27	5	22
Apr. 1986	76	23	1	22

Source : [10, 11]

iii) Other non-tariff barriers

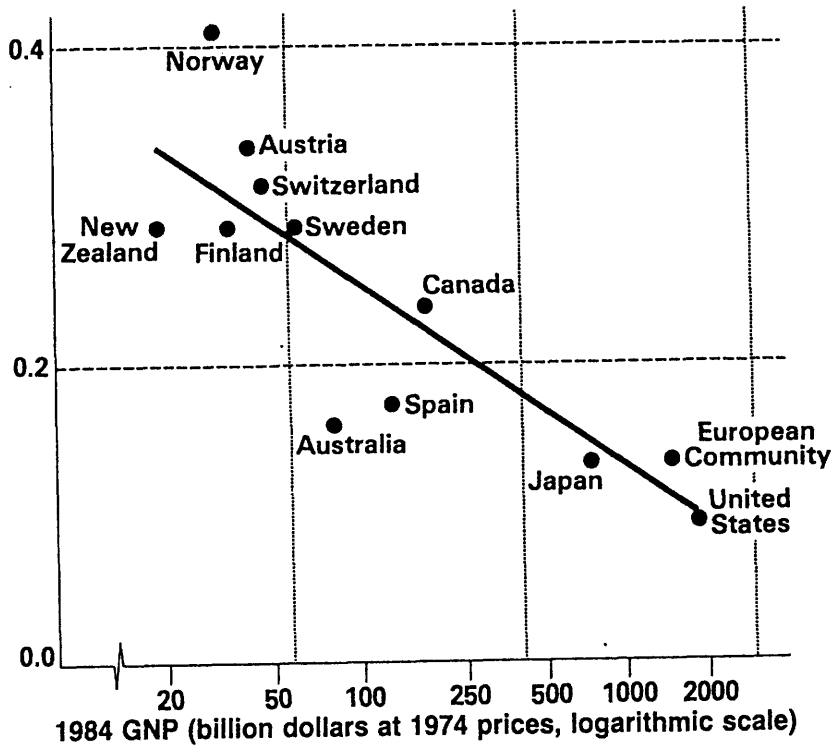
There are several non-tariff barriers other than quotas conceived by foreign businesses, in Japan as well as in the United States. It is very difficult to figure out how much non-tariff barriers are protecting the domestic market from foreign products, but it is the general perception that Japan has a formidable collection of non-tariff barriers [7]. However, some studies such as Cline [9] suggest that non-tariff barriers are no more extensive in Japan than in the United States. The main difference between the non-tariff barriers in the two countries is that those of the United States are much easier for foreign businesses to comprehend, such as an anti-dumping law, a countervailing-duty low, U.S. law Section 201 or escape-clause, the Buy American Act, and so on.

2-2-2 Intangible protection

Intangible protection include government procurement, standards, industrial targets, and some oligopoly systems such as "keiretu" in Japan. These have not been formed intentionally to protect the domestic market from imports, but they work very effectively to do so. Many aspects of the Japanese trade system function as intangible protection, and thus have been criticized by foreign governments and businesses. Cline [9] suggests the use of Import-GNP Ratios to judge the total effect of trade control (Figure 2-3). This figure suggests that Japan's overall protection of its

domestic markets is about average for developed countries.

Figure 2-4 Relationship of import-GNP ratio to size of economy.



Source : [9]

2-3 Future international trade of the two countries

After the Group Five meeting (U.S., Japan, West Germany, England, France) in September 1985, there was a drastic appreciation of the yen and depreciation of the dollar. The yen appreciated from 250 yen per dollar to 160 yen per dollar between August 1985 and July 1986. Following this event, the Japanese international trade surplus was expected to decrease dramatically. So far, the surplus has still remained high

appreciation.

However, Japanese economic conditions have started changing rapidly. Because of the high value of the Japanese yen, Japan cannot compete with the NICs (newly industrialized countries) such as South Korea, Taiwan, and Brazil, in the United States market. This fact indicates that there will be a drastic decrease of exports from Japan to the United States and an increase of Japanese imports from the NICs. In order to survive in the U.S. market, Japanese manufacturers have begun investing directly in the U.S. Some products originally produced in Japan are now imported from the U.S. factories operated by Japanese manufacturers. However so far, direct Japanese investment in the United States, for the most part, reflects demand generated in the United States. This trend will not change in the near future.

While Japanese international trade surplus will decrease, there is no evidence that the U.S. will recover its international trade despite its currency depreciation. Delay in the U.S. economic recovery comes from the independent problem of its domestic rather than international policies. Therefore, the trade surplus of Japan against the United States will continue, even if its disproportion decreases and total Japanese international trade comes into balance.

Chapter 3 The role of the construction industry in Japan and the U.S.

Several studies have been done on the construction industries of the U.S. and Japan, because these industries have large effects on the economies of both countries. This chapter gives a general view of the role of the construction industries in the two countries' economies and evaluates the amount of investment and the employment they generate. Investment in the construction industry is also analyzed to identify components that can be tradeable between the two countries.

3-1 Investment and employment

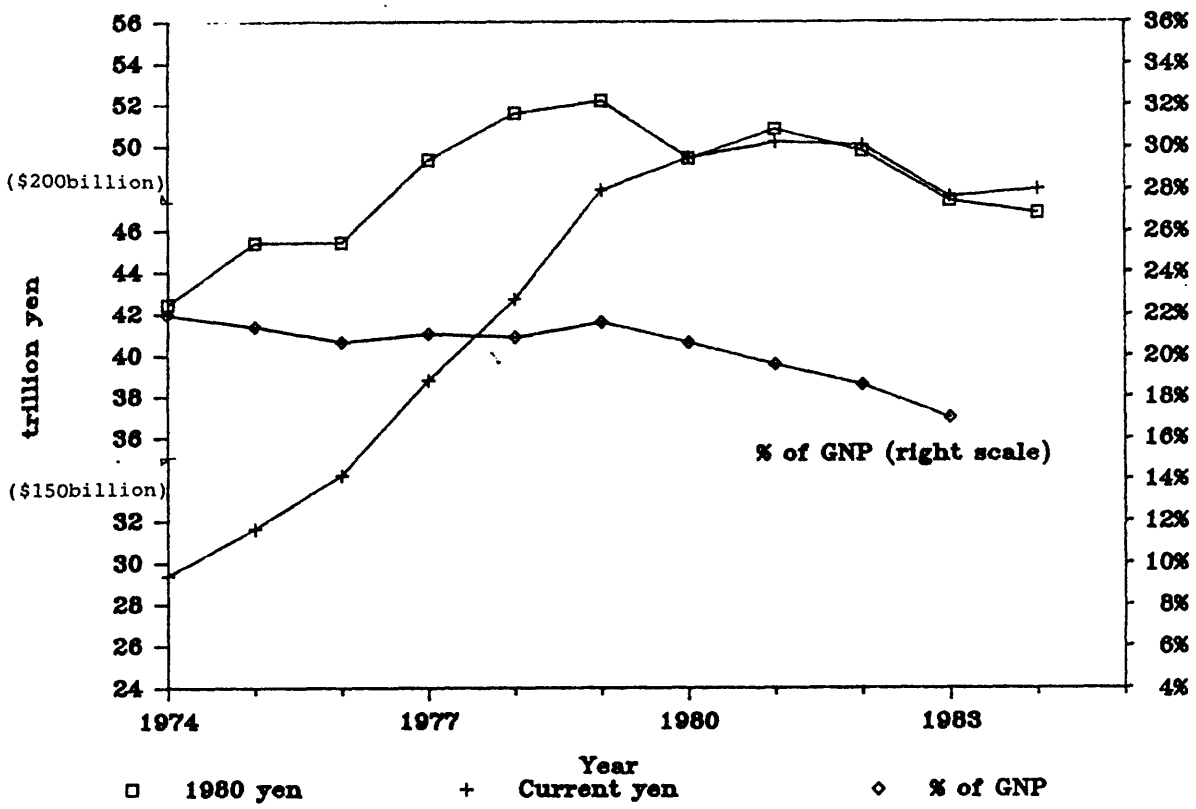
i) Construction investment in Japan

After World War II, the construction industry in Japan played a very important role in the Japanese economy. From the late 1950s Japan's construction investment has been between 15 and 25 percent of the GNP (Gross National Product). Japan's construction investment increased from 29,394 billion yen ($ 100.6 billion) in 1974 to 49,475 billion yen ($ 218.2 billion) in 1980. However, the construction investment's share of the GNP began to decrease after 1979. Figure 3-1 shows total construction investment in Japan (current yen and 1980 yen) and its share in the Japanese GNP. The Japanese construction investment, expressed in 1980 yen, shows a sudden plunge in 1980 due to a change in government

policy and an economic slowdown caused by the second oil crisis.

Figure 3-1

Construction investment in Japan (current yen and 1980 yen)



Note : Dollar figures are on the 1980 yen-dollar exchange rate

Source : [12]

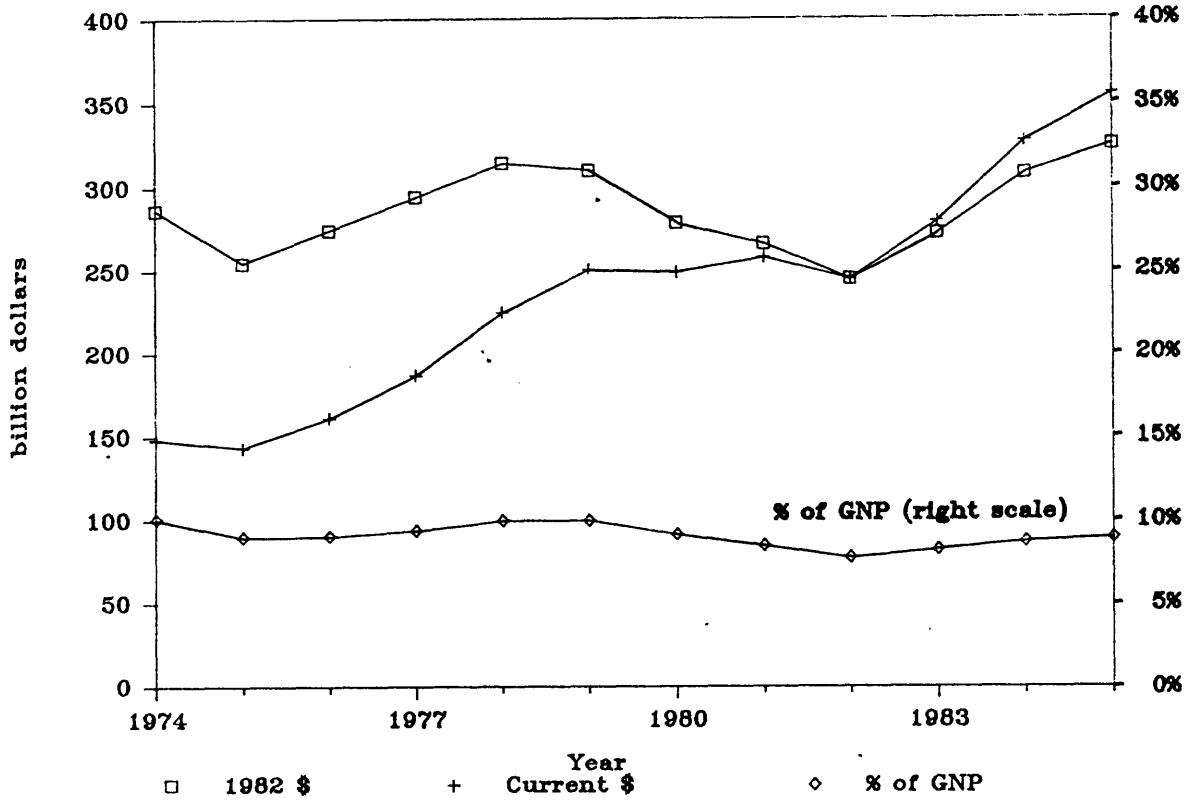
ii) Construction investment in the U.S.

According to the Construction Review [13], new construction investment in the U.S. shows a cyclical movement with a general upward trend, and its share in the GNP has consistently been around 10 percent. These numbers suggest that

the U.S. construction industry has a smaller amount of influence on the U.S. economy than the Japanese construction has on its economy. Figure 3-2 shows the total new construction investment in the U.S. (current dollar and 1980 dollar) and its share in the GNP. Construction investment in the U.S. had grown at almost the same growth rate as that in Japan between 1976 and 1982, but increased rapidly after 1983. Figure 3-3 shows the construction investment growth rate in both countries.

Figure 3-2

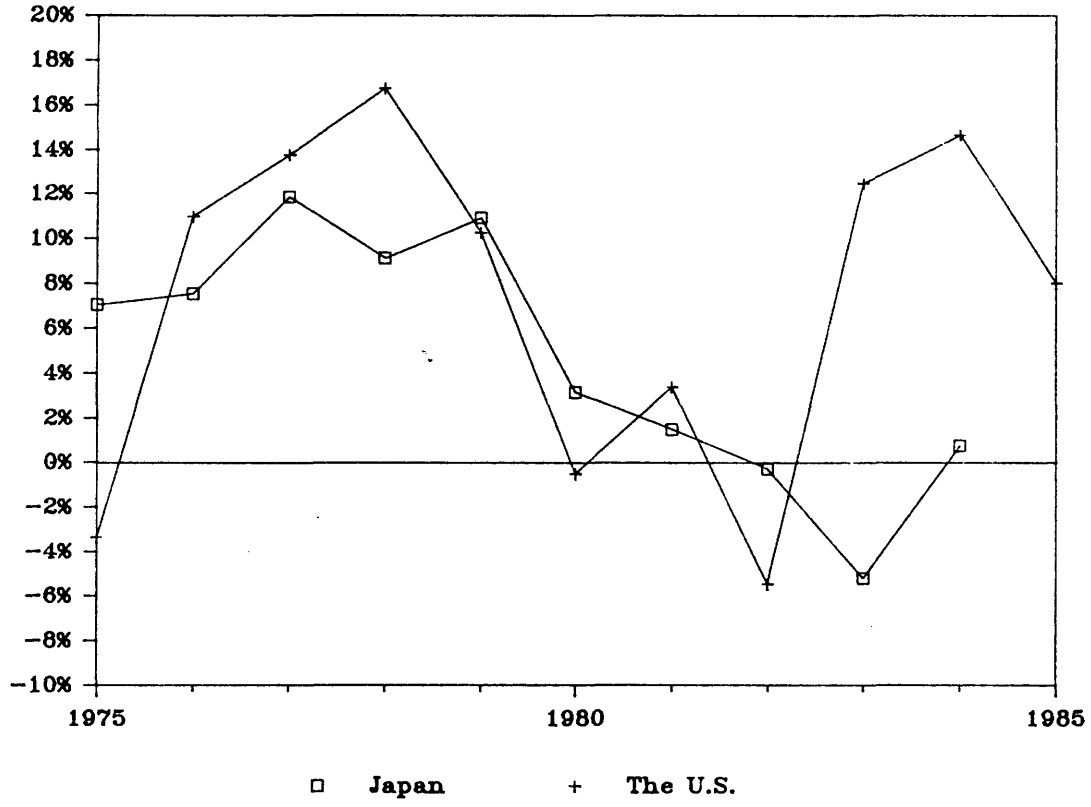
Total new construction investment in the U.S.



Source : [13]

Figure 3-3

Construction investment growth rate in the U.S. and Japan



Construction investment growth rate = $\frac{A - B}{B}$

: where A = Construction investment in that year
B = Construction investment in previous year

Source : [12,13]

iii) Employment in Japan's construction industry

The Japanese construction industry expanded at a rapid pace after World War II, stimulated by a government policy to industrialize the manufacturing industry. The construction industry was a supporting industry for the industrialization [8]. The number of construction firms has grown constantly in Japan from 98,000 in 1965 to 516,000 in 1984 [14]. However, small construction firms, defined as those having no payroll or as firms with the operating capital of less than 100 million yen, comprise 99.3 percent of the total number of construction firms in Japan.

The number of employees in the construction industry increased from 3,280,000 in 1965 to 5,480,000 in 1980, but decreased after 1980. The number of employees in the construction industry has been about 9 to 10 percent of total Japanese employment for all industries for 10 years. Table 3-1 shows the total number of construction firms and total employees. The decreasing share of construction industry employment in total employment indicates the decreasing role of the construction industry in Japan's economy.

Table 3-1 The numbers of registered construction firms and employees in the construction industry in Japan

Year	Construction firms	Employees		
		Construction	All industry	%
1965	98,000	3,280,000	47,300,000	6.9
1970	163,000	3,940,000	50,940,000	7.7
1974	303,000	4,640,000	52,370,000	8.9
1975	351,000	4,790,000	52,230,000	9.2
1976	397,000	4,920,000	52,710,000	9.3
1977	428,000	4,990,000	53,420,000	9.3
1978	461,000	5,200,000	54,080,000	9.6
1979	475,000	5,360,000	54,790,000	9.8
1980	489,000	5,480,000	55,360,000	9.9
1981	496,000	5,440,000	55,810,000	9.7
1982	511,000	5,411,000	56,380,000	9.6
1983	514,000	5,411,000	57,330,000	9.4
1984	516,000	5,270,000	57,660,000	9.1

Source : [14]

iv) Employment in the U.S. construction industry

The U.S. construction industry has consistently been the biggest in the world, consisting of 1,389,309 establishments in 1982 [15]. Table 3-2 shows the total employment in the U.S. and employment in the construction industry. These numbers show the cyclical movement of construction employment which followed the total construction investment. Employment in the construction industry increased 1.1 million within 10 years. (There are not consecutive annual statistics for the number of U.S. construction establishments available.)

Table 3-2 Total employment and construction industry employment in the U.S.

	Construction	All industry	%
1965	3,232,000	60,765,000	5.3
1970	3,588,000	70,880,000	5.1
1975	3,525,000	76,945,000	4.6
1976	3,576,000	79,382,000	4.5
1977	3,851,000	82,471,000	4.7
1978	4,229,000	86,697,000	4.9
1979	4,463,000	89,823,000	5.0
1980	4,346,000	90,406,000	4.8
1981	4,188,000	91,156,000	4.6
1982	3,905,000	89,566,000	4.4
1983	3,948,000	90,200,000	4.4
1984	4,383,000	94,496,000	4.6
1985	4,687,000	97,614,000	4.8

Source : [3]

3-2 Components of construction investment

When we refer to the size of the construction industry, we always use construction investment figures. We know that the construction investment is very large in the U.S. and Japan. From an international trade viewpoint, however, it is misleading to discuss construction investment as a whole. There are several components of construction investment such as compensation for contractors' employees, design fee, contractors' profit, and material consumed in projects. Some of these components can be traded between the U.S. and Japan and some cannot.

Table 3-3 shows direct-input into the construction industry in Japan with the total input divided into two

categories: (1) intermediate input from other industries and (2) the value-added component of input. Table 3-4 gives detailed information about intermediate input from other industries in Japan. The direct input into the U.S. construction industry is shown in Table 3-5 in the same manner as Table 3-3. Detailed information of intermediate input from other industries are shown in Table 3-6.

Table 3-3

Direct input into construction industry in Japan

percent

Year	1960	1965	1970	1975	1980
Total input from other industries	68	63	62	57	58
Value-added component	32	37	38	43	42

Source : [16]

Table 3-4

Intermediate input structure of the construction industry in Japan

percent

Year	1960	1965	1970	1975	1980
Materials	76.0	74.3	72.5	67.1	68.0
(materials)	(47.4)	(45.3)	(42.1)	(39.7)	(37.7)
(products)	(15.3)	(17.6)	(19.9)	(20.5)	(20.6)
(machinery)	(13.3)	(11.4)	(10.5)	(6.9)	(9.7)
Elect. power supply	0.2	0.6	0.5	0.9	1.1
Trade & Trans.	12.3	15.7	14.5	18.7	17.5
Finance & Insurance	1.3	1.9	1.8	2.5	2.0
Service	0.9	1.2	3.1	3.8	5.7
Other	9.4	6.3	7.7	7.0	5.8

Source : [17]

Table 3-5

Direct input into the construction industry in the U.S.

percent

Year	1960	1965	1970	1975	1980
Total input from other industry	58	57	56	54	58
Value-added component	42	43	44	46	42

Source : [18]

Table 3-6

Intermediate input structure of the construction industry in the U.S.

percent

Year	1958	1963	1967	1972	1977
Materials	63.8	64.0	64.1	63.8	62.5
(materials)	(39.0)	(37.7)	(35.3)	(36.2)	(36.9)
(products)	(16.6)	(18.2)	(20.6)	(18.4)	(16.9)
(machinery)	(8.2)	(8.1)	(8.2)	(9.2)	(8.7)
Elect. power supply	0.4	0.6	0.1	0.2	0.5
Trade & Trans.	21.1	20.3	18.8	19.0	19.1
Finance & Insurance	1.2	1.2	1.1	1.2	1.5
Service	6.2	6.7	8.5	9.2	9.9
Other	6.7	7.2	7.4	6.6	6.3

Source : [17]

According to these tables, we can categorize direct input into the following four parts: (1) value-added component, i.e. contractors' expenses and profits which are defined as compensation to employees, capital consumption, indirect taxes, outside household expenses, and subsidy (negative expense); (2) construction materials such as materials and products from other industries, which contractors or client buy at the market and bring into the construction project; (3) design and engineering services including service activities by design firms, engineering consultants, CM (construction management), etc; and (4) other input such as utilities, finance, and transportation.

We can see that the biggest part of construction investment in the U.S., as well as in Japan, is the value-added component which is almost equal to contractors' expenses. The second largest component is construction materials. Given the structure of the construction industry in the U.S. and Japan, the value-added part of investment is not tradeable. We can see a lot of examples indicating that the value-added part of investment is actually traded between a developed country and a developing country. For example, some high technology projects in developing countries such as Saudi Arabia and Egypt require the importation of many skilled workers. However, this is not the case for Japanese projects in the U.S. Japanese contractors operating in the U.S. are conducting service-sector activities.

The activity of the Japanese constructors in the domestic as well as in the U.S. market was examined by Hasegawa [17], Homma [19], Minami [20], and Sugimoto [8] from various viewpoints in 1986. Since the value-added component is not tradeable, the second largest component (construction materials) is the largest component tradeable between the U.S. and Japan. This thesis will focus on the construction material component of construction investment in the U.S. and Japan.

The construction industry in Japan plays a role as a big consumer of other industries' products. Table 3-7 shows the inputs to the construction industry from other industries and their shares of each industry's output in Japan. This table

shows that there are four industries whose output are heavily consumed (about 50 percent) by the construction industry in 1980.

Table 3-7

Input into the construction industry from other industries in Japan in 1980

	Input billion yen ($ billion)		% of each industry	
Mining other than metal	1,112.6	(4.9)	52.5	*
Miscellaneous textile products	335.7	(1.5)	19.3	
Wood, Wooden products mfg.	2,858.4	(12.6)	57.7	*
Furniture & Fixture	934.0	(4.1)	28.8	
Coal products	341.8	(1.5)	13.8	
Stone, Clay & Glass products	4,767.0	(21.0)	57.8	*
Iron and Steel rolled products	1,728.8	(7.6)	11.9	
Cast and forged steel products	267.3	(1.2)	6.9	
Basic non-ferrous products	668.5	(3.0)	14.5	
Metal products	4,859.6	(21.4)	46.7	*
Machinery except electrical	1,286.6	(5.7)	5.6	
Heavy electrical apparatus	280.3	(1.2)	8.0	
Miscellaneous industrial products	767.0	(3.4)	9.4	
Gas supply	80.1	(0.4)	5.6	
Wholesale and retail sale	3,558.6	(15.7)	6.9	
Real estate rental	310.1	(1.4)	6.5	
Transport except for private	1,094.1	(4.8)	5.3	
Private transport	1,036.8	(4.6)	8.8	
Other communication services	221.4	(1.0)	6.3	
Others	650.0	(2.9)	8.8	

Source : [8]

The U.S. construction industry also plays an important role in the U.S. economy as a consumer of other industries output. However, due to the relatively small share in the GNP by the U.S. construction industry compared to Japan's counterpart, the share of consumption by the construction

industry of other industries' outputs is commensurately smaller. Table 3-8 shows the inputs to the construction industry from other industries and their shares of each industry's output in the United States. This table indicates that one industry group alone (stone, clay & glass products) contributes nearly half of its output to the construction industry.

Table 3-8

Input into the construction industry from other industries in the U.S. in 1977

	Input ($ billion)	% of each industry	
Mining other than metal	2,115	9.0	
Wood products & furniture	18,688	33.6	
Chemicals & chemical products	3,489	3.1	
Petroleum & coal products	7,137	7.2	
Rubber, plastics & leather	3,040	6.5	
Stone, clay & glass products	15,913	46.0	*
Primary & fabricated metals	32,460	17.2	
Machinery except electrical	5,657	4.8	
Electrical equipment & supplies	7,216	8.1	
Transportation and trade	28,945	5.7	

Source : [8]

Chapter 4 analyzes the construction materials market and indicates that nearly 80 percent of the total quantity of hard plywood consumed in the U.S. depends on imports. This thesis, in Chapter 4 and 5, also shows that the structure of the construction materials market in the U.S. as well as in Japan may change rapidly by the end of this century. It is, therefore, very important to analyze the present situation of

the construction materials market for the two countries in order to recognize the problems faced by construction material manufacturers and to forecast the future of the construction materials markets in the two countries.

Chapter 4 The U.S. Construction Materials Market

In this chapter we discuss the U.S. market for foreign construction materials, especially those from Japan. The analysis focuses on several materials including: cement, steel, lumber, plywood, clay materials (brick and tile), glass, and construction machinery. Each product (except for soft plywood and brick) will be analyzed on the basis of the following factors:

a) Total consumption and total imports;

b) Imports from Japan;

c) Import effects on the U.S. materials industry and market;

d) The U.S. manufacturers' response to imports;

e) Exporters' (especially Japan's) response to the U.S. market.

Note : Constant dollar figures of total consumption are calculated according to producer price indexes in Table B-2 in the appendix.

4-1 Cement

Throughout the world, two major types of production systems are used to produce two different types of cement products: pure portland cement and blended cements. Portland cement contains lime, silica, alumina, and iron oxide, which vary in proportions depending upon the specific application. These ingredients are derived from the raw materials of limestone, shell beds, clay, shale and slate deposits from quarries. During refining, raw materials are burned into clinker in the kiln, and the clinker is ground into a fine powder with a small amount of gypsum in proportions suitable for specific applications. Gypsum affects the drying time and the hardness of early age cement. About 90 percent of cement production in the United States is portland cement. Blended cements consist of portland clinker mixed with natural filler or industrial by-products, such as fly ash and blast furnace slag. The production of blended cements requires a smaller amount of energy than portland cement.

The two different types of production systems are wet-process and dry-process clinker production. In a short historical sketch, The World Bank describes the relative cost advantage of the new dry process which was introduced in the 1950s.

> Historical Development :
> Until about 1925, clinker was produced mainly by the dry process in vertical kilns (batch processing) or in rotary (continuous processing) kilns, which were relatively small and fuel inefficient, requiring an average thermal energy

input of about 3,000 kcal/kg of clinker. The next technological step forward was the introduction of the wet process in the rotary kiln where the kiln feed is introduced as a slurry rather than a dry powder. This process permitted better homogenization of kiln feed, simpler and easier operation, less dust emission, more uniform cement quality, and better overall economy including a reduction in energy consumption to about 1,600 kcal/kg of clinker. The advent of better raw meal homogenization and dust collection system led to the return of long dry rotary kilns. The major advantage was the lowering of the thermal heat requirement to about 1,000 kcal/kg. The next major advantage technological step was the invention of the suspension pre-heater, which was first installed in the 1950s and since become the standard type of cement kiln.

Source : [21]

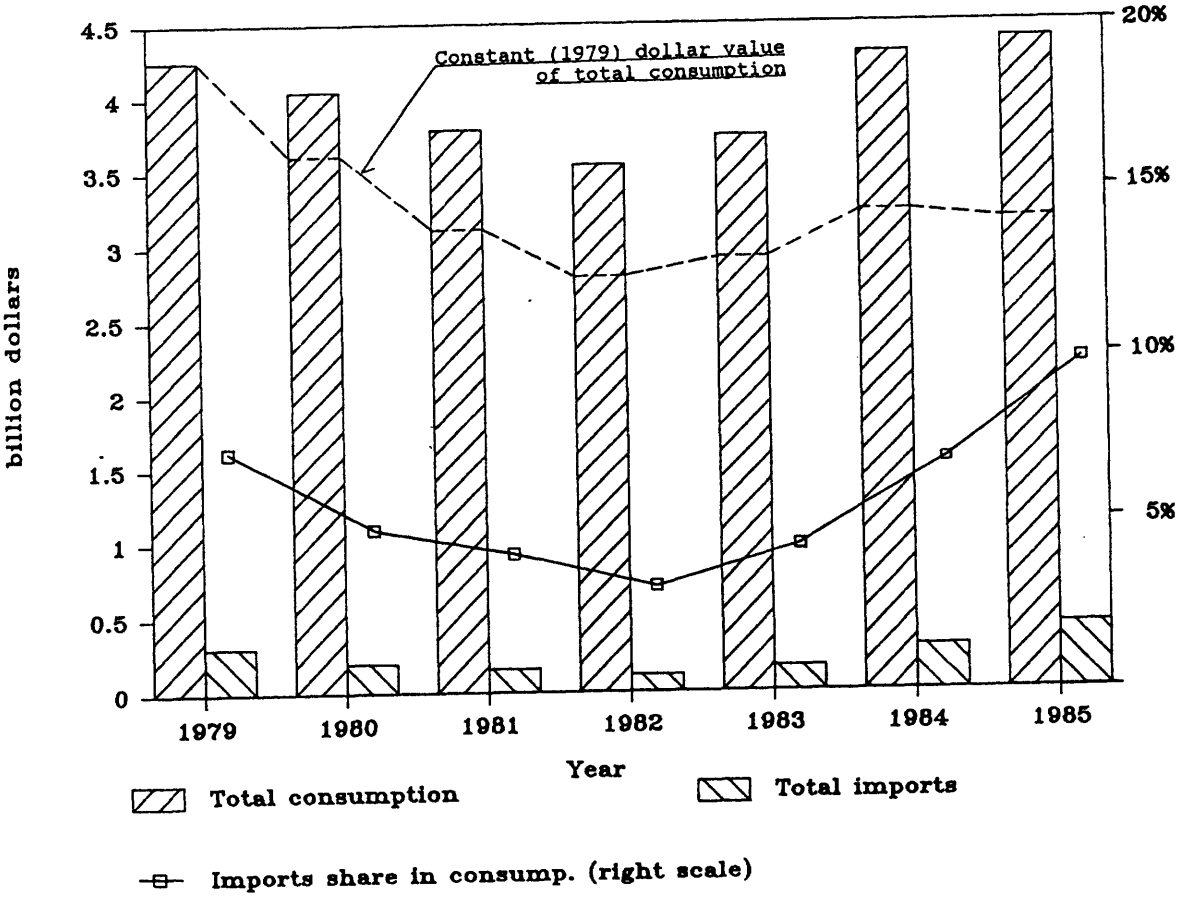
The dry-process is popular in Japan and EC countries where energy is relatively expensive, and the wet-process is still popular in the United States, due to relatively low energy costs.

a) Total cement consumption and imports

The value of total consumption and total imports of cements in the United States is shown in Figure 4-1. Total cement consumption fluctuates with the total construction investment. The share of imported cement value in the total U.S. consumption fluctuates more than does total consumption.

Figure 4-1

Cement in the U.S. :
Total consumption and total imports



Source : [22]

b) Imports from Japan

According to the Mineral Industry Surveys [23], cement imports from Japan used only eight ports in the U.S.; of these, six handled 99.9 percent of the cement imported from Japan in 1985. These ports are Anchorage, Los Angeles, Portland (Ore.), San Diego, San Francisco, and Seattle. In contrast with Japanese exports, the main cement exporters to the United States (Canada, Mexico, Spain and Venezuela) are

using from 12 to 18 ports, because they are exporting a larger volume than Japan (Table 4-1). According to U.S. statistics, cement imports from Japan decreased from $25.7 million in 1980 to $0.0 million in 1983, and then increased up to $37.1 million in 1985 (Table A-1,A-2 in the appendix). Cement imports from Japan followed the same general pattern of fluctuation as did the total imports from 1980 to 1985 with one difference: fluctuations in the pattern of imports from Japan consistently occurred one year later than those in the general imports pattern (Figure 4-2). This finding suggests that the Japanese cement exports to the United States are arranged in a large volume and far in advance in order to achieve price competitiveness by economy of scale.

Table 4-1

U.S. imports for consumption of hydraulic cement and clinker, by country

volume : thousand short tons
value : thousand dollars

Country	1983 Quantity	1984 Quantity	1985 Quantity
Canada	2,201	2,945	3,393
Colombia	68	227	662
France	153	225	552
Greece			511
Japan	1/	183	1,134
Rep.Korea	69	332	484
Mexico	826	2,003	2,502
Spain	737	1,760	3,383
Venezuela	60	1,022	1,569
Other	154	149	298
Total	4,268	8,846	14,488

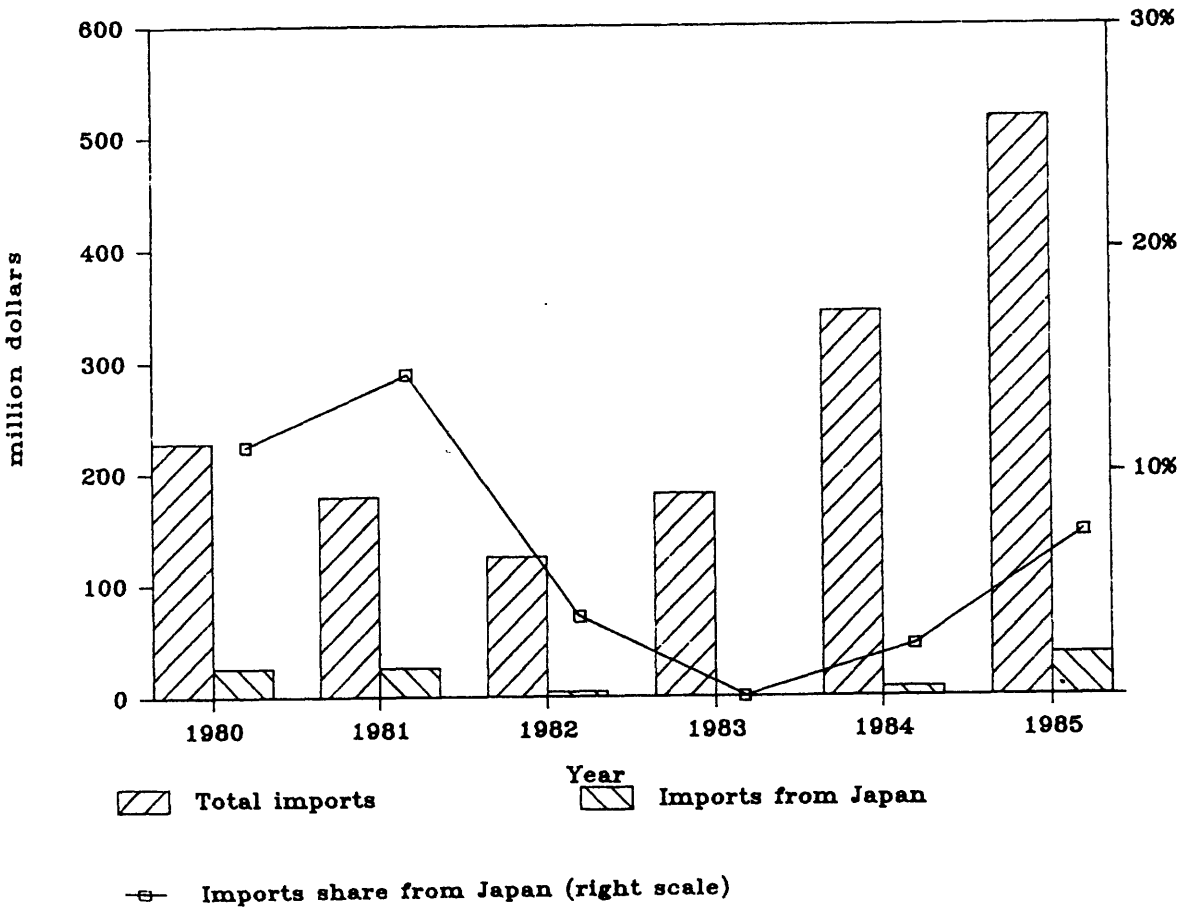
	Value		Value		Value	
	Customs	C.I.F.	Customs	C.I.F.	Customs	C.I.F.
Canada	86,198	92,851	116,815	128,920	125,181	137,576
Colombia	3,345	4,169	5,133	6,927	16,430	20,244
France	6,435	7,507	7,044	9,180	13,866	18,319
Greece					9,760	12,202
Japan	100	118	5,237	7,595	28,786	37,105
Rep.Korea	3,228	4,144	10,046	12,129	26,194	29,738
Mexico	30,844	33,539	64,574	74,877	75,755	87,339
Spain	23,833	29,303	49,584	61,218	80,448	103,353
Venezuela	1,705	2,138	25,281	32,224	38,282	50,320
Other	5,751	7,756	10,493	10,412	16,791	20,148
Total	161,439	181,525	294,207	343,482	431,493	516,344
Average Price $/ton		42.5		38.8		35.6

1/ less than 1/2 unit

Source : [23]

Figure 4-2

Cement in the U.S. :
Total imports and imports from Japan



Source : [24]

c) Effects of imports

The share of imports in the new cement supply expressed in terms of volume was relatively constant throughout the 1970s and early 1980s, except for 1979. The share of imports increased dramatically within the three years from 1984 through 1986 (Table 4-2).

Table 4-2

U.S. cement shipment, imports, new supply, and imports as a percent of new supply.

thousand short tons

Year	U.S. domestic shipment 1/	U.S. imports	New cement supply 2/	Imports share in new cement supply
1972	80,101	4,911	85,012	5.8%
1973	84,032	6,683	90,715	7.4%
1974	77,160	5,732	82,892	6.9%
1975	66,425	3,702	70,127	5.3%
1976	71,062	3,107	74,169	4.2%
1977	77,548	4,038	81,586	4.9%
1978	81,042	6,597	87,639	7.5%
1979	78,406	9,413	87,819	10.7%
1980	72,355	5,263	77,618	6.8%
1981	69,358	3,997	73,355	5.4%
1982	62,712	2,929	65,641	4.5%
1983	69,318	4,268	73,586	5.8%
1984	75,431	8,846	84,277	10.5%
1985	72,913	14,487	87,400	16.6%
1986	74,800	16,200	91,000	17.8%

1/ These figure have been adjusted to eliminate duplication of imported clinker and cement shipped by domestic cement manufacturers.

2/ These figures reflect domestic products shipped from manufacturers, plus imports.

Source : [23]

The effect of cement imports on domestic price competition and on construction prices are suggested by the following information.

> Contractors found average U.S. cement prices 2.6% lower in 1986 (than in 1985). But there were dramatic price differentials nationwide depending on the availability of imports. Coastal cities or those on major intracoastal waterways, for example, gleaned tremendous savings on cement purchases while some inland cities faced with high transportation cost paid a premium. Contractors in

> Minneapolis, with Canadian imports coming down the St. Lawrence River, paid $49.80 per ton in December, the lowest price among ENR's 20 cities. Denver-based contractors, on the other hand, paid $81.80 per ton up more than 9% from last year (1985). Contractors in other port cities such as Philadelphia, Baltimore and New York enjoyed cement price declines of 15, 13 and 7.5% respectively [ENR Dec.18, 1986 P34].

In 1986, the American Cement Trade Alliance (ACTA), an organization of domestic cement producers, petitioned the U.S. International Trade Administration (ITA) and the International Trade Commission (ITC) for an anti-dumping action against eight cement exporting countries. These countries were Colombia, France, Greece, Japan, Mexico, Republic of Korea, Spain, and Venezuela. However, the ITC determined that the domestic cement industry had not proven that imports harmed or threatened to harm their business.

Table 4-1 shows the overall average price of imported cement on a C.I.F. basis. It indicates that the imported cement price was $35.60 per short ton in 1985, while the domestic average price was around $54 per short ton.3/ This price difference makes imported cement very competitive in the United States market and puts the domestic manufacturers at a competitive disadvantage.

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3 ENR shows the quotation price as $64.98 per short ton, and this price is usually 20 percent higher than the actually traded price.

d) U.S. manufacturers' response to imports

Characteristics of cement production are its low value-added per tonnage, high initial cost for plant installation cost and high production energy requirement. All of these characteristics affect the cement production and trade in the United States. According to the Mineral Industry Surveys [23], the volume of domestic production fluctuates about 10 percent or 20 percent annually (Table 4-3).

Because cement production requires high initial plant installation and high production energy cost, domestic producers can not adjust their production volume easily to market demand. Because cement has a very low value-added per volume and weight, its international transportation has to be carefully arranged to ensure price competitive. Therefore, when domestic production does not increase or decrease, both imports and stocks adjust to the total market demand. In fact, domestic cement producers are handling most of the imports. They are selling imported cement where it is available; they are selling their products wherever the imported cement cannot be sold economically, and they are using imported cement to adjust shipments over their own production. It is reported that the domestic cement industry is distributing 70 percent of the imported cement [ENR Nov.27,1986 P32].

Table 4-3

Salient cement statistics in the U.S. 1/

Thousand short tons unless otherwise specified

Year	1981	1982	1983	1984	1985
Production 2/	71,710	63,355	70,420	77,700	77,895
Shipment from mill 2/3/	71,748	64,066	70,933	80,166	83,052
Value million	$3,723	$3,264	$3,534	$4,152	$4,288
Average value per ton 2/3/4/	$51.9	$50.9	$50.0	$51.8	$51.6
Stocks at mill 2/ Dec.31	7,372	6,753	6,711	6,866	7,232
Exports	300	201	118	80	98
Imports for consumption	3,963	2,911	4,221	8,689	14,120
Consumption apparent 5/6/	73,321	65,623	73,435	84,313	87,581

1/ Excludes Puerto Rico and the Virgin Islands.
2/ Portland and masonry cement only.
3/ Include imported cement shipped by domestic producers
4/ Value received, f.o.b. mill, excluding cost of containers.
5/ Quantity shipped, plus imports, minus exports.
6/ Adjusted to eliminate duplication of imported clinker and cement shipped by domestic cement manufacturers.

Source : [23]

e) Exporters' response to the U.S. market

Even after the devaluation of the U.S. dollar against the currencies of Japan and EC countries, cement exporters in these countries are trying to retain a share of the most lucrative construction market in the world, using a different entry mode (direct investment) into the United States market.

Mineral Industry Surveys [23] says that by the end of 1986, approximately 30 percent of clinker and 35 percent of finish grinding capacity in the United States had been acquired by foreign interests. It is further reported that Japan and the EC countries, especially France, are seeking direct financial involvement in the United States cement market [ENR Nov.27, 1986 P33].

ENR suggests that cement from Mexico will flood the United States in 1987, because of the devaluation of the Mexican peso against the U.S. dollar and the probable elimination of a compensatory tax on imports from Mexico by its entering the GATT (General Agreement on Tariffs and Trade). Table A-1,A-2 in the appendix show detailed information about cement shipment and trade in the U.S.

4-2 Steel

Two steel products generally used in construction will be discussed in 4-2-2, structural steel, and 4-2-3, concrete reinforcing bars. For each specific material, the following will be discussed: (a) total consumption and total imports; (b) imports from Japan; and (c) the effect of imports on the U.S. construction materials industry and market. Those items such as (d) U.S. manufacturers' response to the imports and (e) exporters' response to the U.S. market will be discussed generally in section 4-2-3.

4-2-1 General view of steel mill products

There are two main groups in the steel mill industry: integrated producers and non-integrated producers with electric furnaces. There are approximately 15 firms operating 36 integrated steel plants in the United States. These mills are capital-intensive, having a net plant value of $30,000 to $40,000 per employee. In 1981 there were more than 50 non-integrated producers operating more than 60 plants in the United States. These mills are less capital intensive than those of integrated producers. The net plant value is about $15,000 to $25,000 per employees [25]. More detailed information on different types of mills is presented in Table 4-4.

Table 4-4

Characteristics of principal methods of producing steel

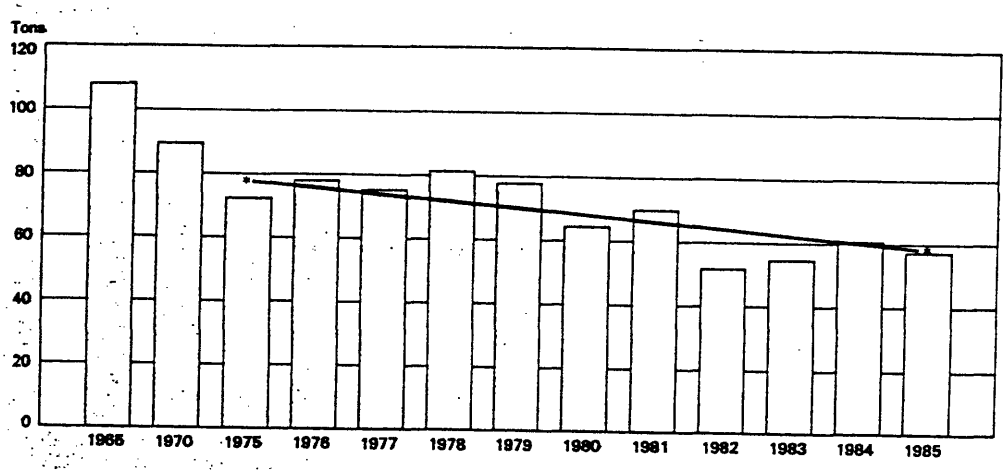
	Integrated steel plant		Mini-steel plant	
	BF-OHF	BF-BOF	DR-EAF	Scrap-EAF
Type of furnace				
Iron-making stage	Blast furnace	Blast furnace	Direct reduction furnace	-
Steel-making stage	Open hearth furnace	Basic oxygen furnace	Electric arc furnace	Electric arc furnace
Capacity range (million t/y)	0.5-2.0	0.5-3.7	0.2-1.0	0.2-0.8
Investment cost (US$/t installed in 1982 prices)	1,700-2,000	1,500-1,800	500-900	350-550
Main material input	Iron ore, scrap	Iron ore, scrap	Iron ore, scrap	Scrap
Main energy input	Coking coal, oil, electr.	Coking coal, oil, electr.	Natural gas, electr.	Electr.

Source : [26]

The United States steel mill industry faces the long-term decline of the steel usage in the U.S. economy and the highly competitive trade environment. Figure 4-3 shows the continuously declining trend of steel utilization in the U.S. economy.

Figure 4-3

Apparent steel consumption in tons per million dollars of real GNP in the U.S.



Source : [22]

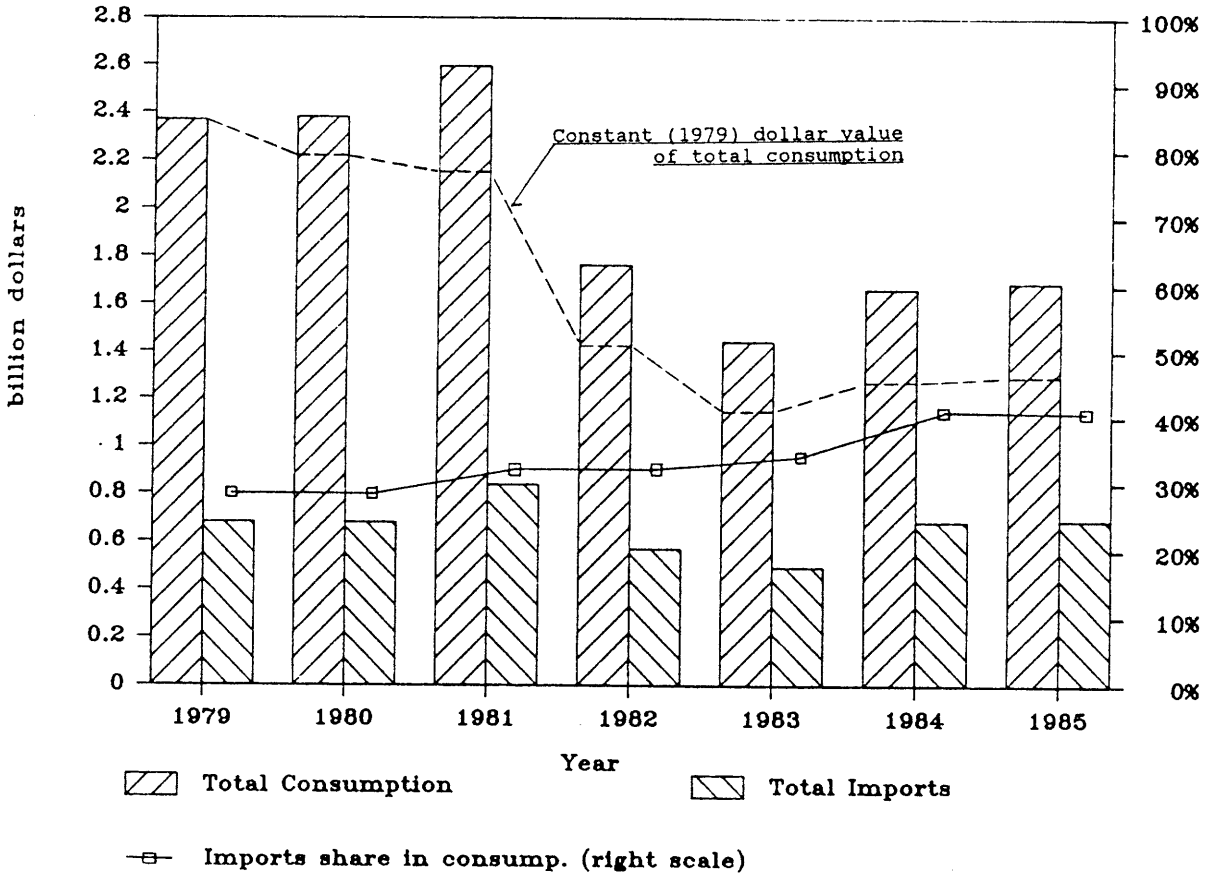
4-2-2 Structural steel (SIC 3312415)

a) Total structural steel consumption and total imports

Total consumption and total imports of structural steel in the United States are shown in Figure 4-4. Table 4-5 shows the market for structural steel in the United States.

Figure 4-4

Structural steel in the U.S. :
Total consumption and total imports



Source : [28]

Table 4-5

Market for structural steel in the U.S.

	1981	1982	1983
	Quantity (1,000 net tons)		
Steel service centers and distributors	1056	576	387
Construction and contractors' products	1928	1470	1421
Machinery, industrial equipment, and tools	164	88	54
Shipbuilding and marine equipment	122	40	32
All other	692	703	834
Total	3962	2877	2728
	Percent of total		
Steel service centers and distributors	26.7	20.0	14.2
Construction and contractors' products	48.7	51.1	52.1
Machinery, industrial equipment, and tools	4.1	3.1	2.0
Shipbuilding and marine equipment	3.1	1.4	1.2
All other	17.5	24.4	30.6
Total	100.0	100.0	100.0

Source : [27]

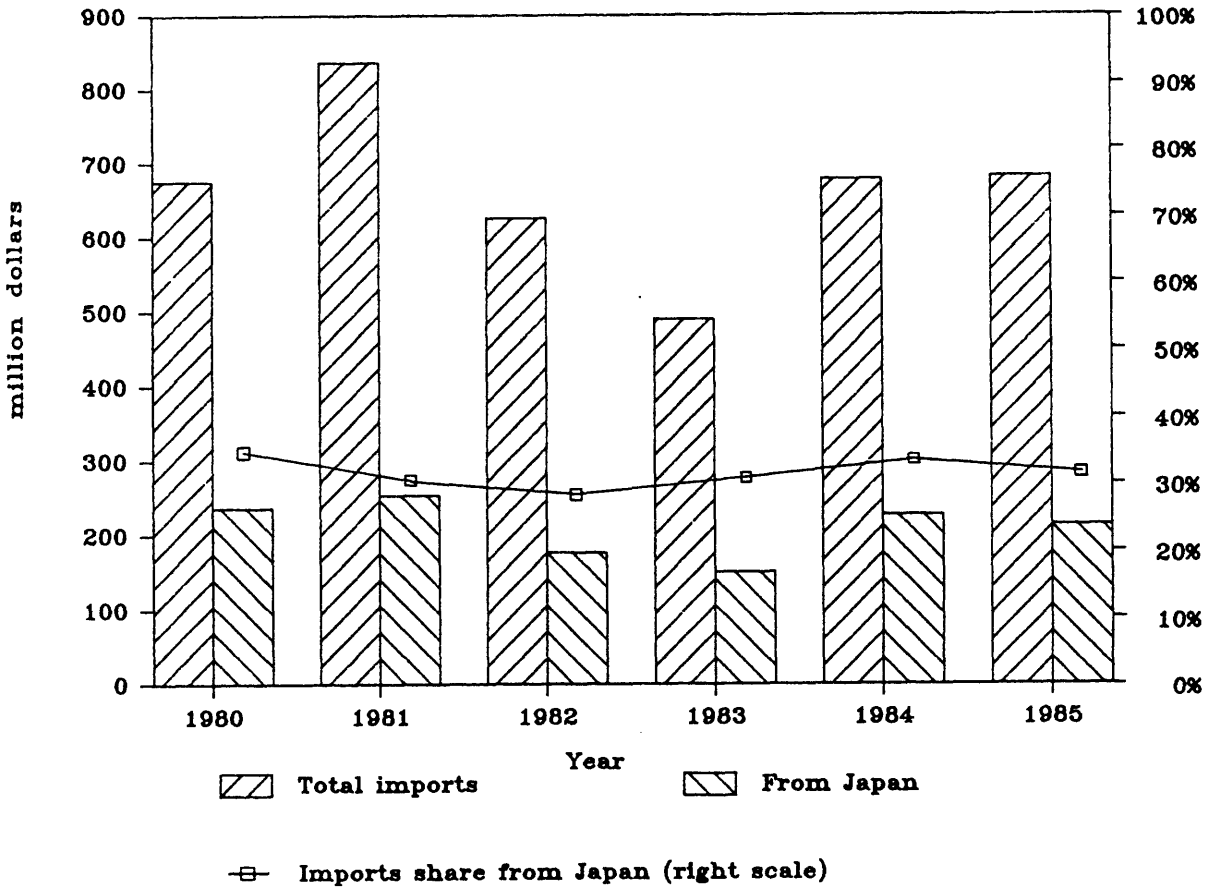
Total consumption and total imports fluctuate in accordance with the total construction investment in the United States, but the imports fluctuate less than the total consumption. This means that the imported structural steel is more competitive than the domestic products in the depressed United States market. Manufacturers' shipments decreased from 4.7 million short tons in 1979 to 2.8 million short tons in 1984. Therefore, as Figure 4-4 shows, despite the fluctuation in the value of total structural steel imports, their share of the total consumption increased steadily from 29 percent in 1979 to 41 percent in 1984.

b) Imports from Japan

Among the structural steel imports, Japan's share is the largest and is relatively constant at slightly above 30 percent, but the rapid appreciation of the yen against the U.S. dollar should decrease this share after 1986 (Figure 4-5). The next most important structural steel exporters to the U.S. are industrialized countries such as Belgium, Canada, West Germany, and France. These countries were the major exporters of structural steel to the United States in the 1980s. This contrasts with the fact that the major exporters of concrete reinforcing bars to the United States changed rapidly, which will be discussed later.

Figure 4-5

Structural steel in the U.S. :
Total imports and imports from Japan



Source : [24]

c) Effect of imports

Increased imports of structural steel had a great effect on the United States construction market. First, the increase made the market highly competitive for domestic manufacturers who were forced to close inefficient plants and rush into rationalization.

Second, competition made it difficult for a steel mill to raise prices. Contractors enjoyed stable market prices in

buying steel. However, even drastic conditions such as a strike beginning in the summer of 1986 at USX Corp., the nation's largest steel producer, failed to enable competing steel makers to boost the lagging price of steel.

The value of imported structural steel was about $320 per short ton in 1984. In constant, that of a domestic structural steel was $361 per short ton on a factory F.O.B. basis (Table A-3). Using imported structural steel cost customers 12 percent less.

Tables A-3, A-4 in the appendix show detailed information about structural steel shipment and trade of the U.S.

4-2-3 Concrete reinforcing bars (SIC 3313326)

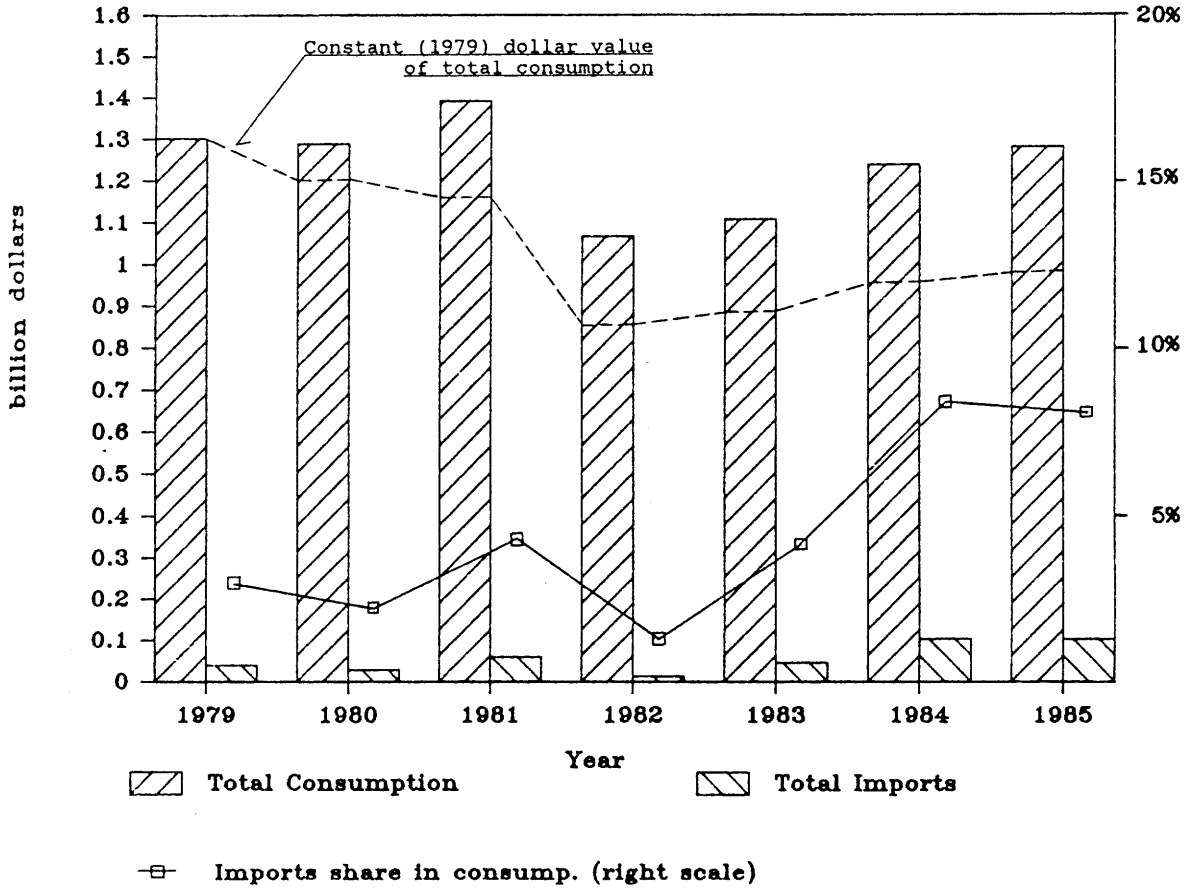
a) Total consumption and total imports

Almost all concrete reinforcing bars are used in the construction industry. Figure 4-6 shows the total consumption and total imports in the United States. The total consumption of concrete reinforcing bars fluctuates according to the total construction investment, but this fluctuation is less than that of the total consumption of structural steel. The total consumption of concrete reinforcing bars dropped from $1.39 billion in 1981 to $1.07 billion in 1982. This is a 23 percent decline in a year. In contrast, the decline of structural steel changed from $2.6 billion in 1981 to $1.77 billion in 1982. This is a 32 percent decline in a year.

This reveals that during the recession of 1982 the production of big projects, such as high-rise office buildings which use structural steel, was more depressed than the production of small projects, which use concrete structures.

Figure 4-6

Concrete reinforcing bars in the U.S. :
Total consumption and total imports



Source : [28]

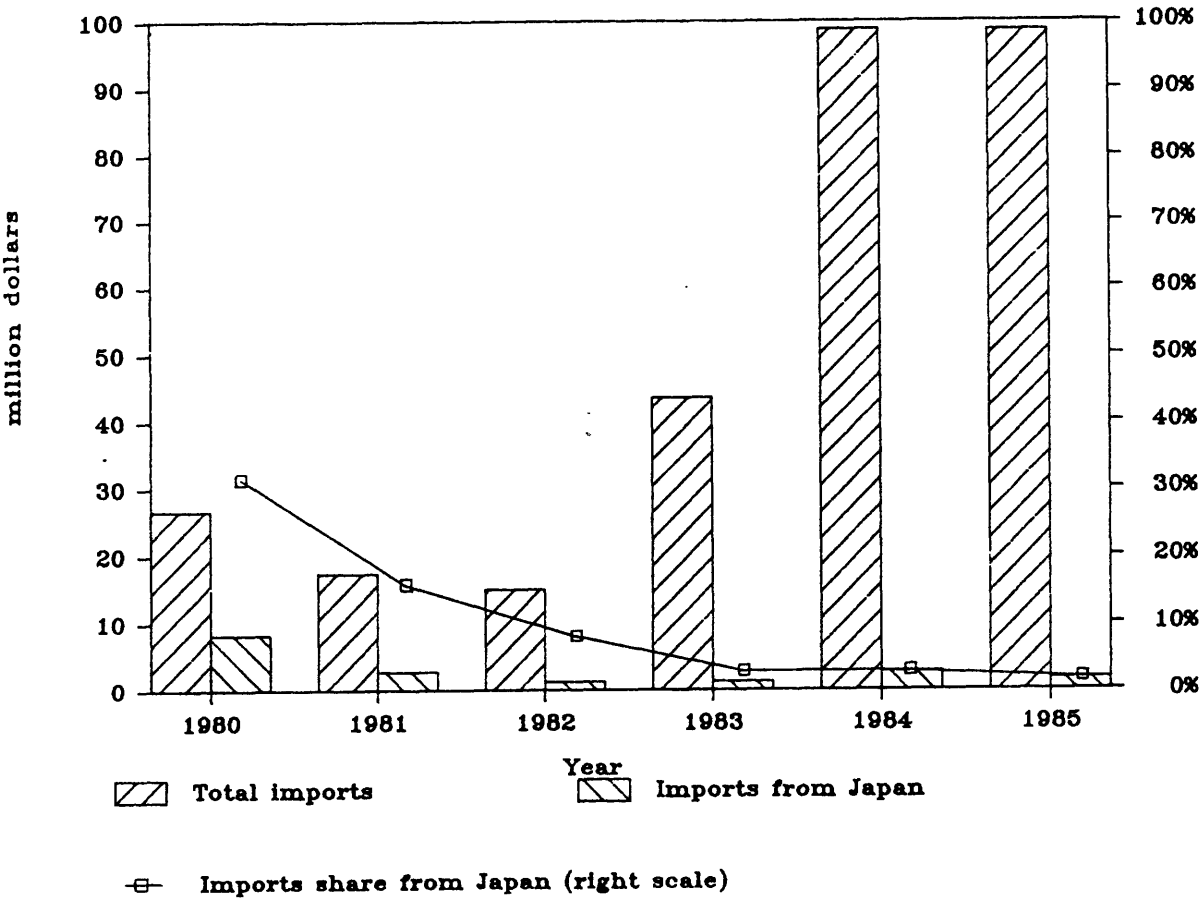
Compared to structural steel, the import of concrete reinforcing bars is a very small fraction of the total consumption, and the main exporters of this material changed within these five years. The main exporters of concrete reinforcing bars were Japan, Brazil, South Africa, France, and Norway in 1981. In 1985 the major exporters were Brazil, Venezuela, Italy, and Republic of Korea.

b) Imports from Japan

Figure 4-7 shows the total imports of concrete reinforcing bars and Japan's share of them. It reveals a constant declining trend of the Japanese share in the United States market for concrete reinforcing bars, despite the substantial growth of the total imports to the United States. As mentioned before, the price of imported structural steel and concrete reinforcing bars are $320 and $241 per short ton respectively. Therefore, the sale of concrete reinforcing bars, which has less value-added than structural steel, became less attractive to the industrialized countries. With high technology to supply high value-added material, the industrialized countries have tried to sell structural steel instead of concrete reinforcing bars.

Figure 4-7

Concrete reinforcing bars in the U.S. :
Total imports and imports from Japan



Source : [24]

c) Effects of imports

The value of imported concrete reinforcing bars was about $241 per short ton on a C.I.F. duty-paid basis in 1984 (Table A-5 in the appendix). That of the bars produced at domestic steel mills was $272 per short ton on factory F.O.B. basis. This means that imported concrete reinforcing bars cost 12 percent less than domestic products. This is creating fierce competition in the domestic market.

However, imported concrete reinforcing bars have to compete with the most efficient segment among the ailing U.S. steel industry, the mini-mill. Exporters having sufficient technology and capacity to produce structural steel are trying to export structural steel to the U.S. instead of concrete reinforcing bars. Therefore, the share of imports in total consumption is still small compared to that of structural steel.

d) U.S. manufacturers' response to imports

Generally speaking, except for specialty steel products, the price differences of steel mill products among developed countries are determined both by labor costs and the prices of available raw materials. The practice of price dumping in the world market also has a big effect in the international market. Historically, U.S. manufacturers, who incur the most expensive labor costs in the world, are trying to protect the domestic market from foreign imports by surtaxes and quotas.

The importing of steel mill products continuously increased in the United States market until mid-1985. Over-capacitated world steel producers have been trying to find sales in the most active market in the world, the United States. However, the President's import restraint program, which has been in effect since October 1984, has limited Japan's share of the United States market to 5.3 percent; South Korea's to 1.9 percent; Brazil's to 0.8 percent; Spain's to 0.67 percent; South Africa's to 0.42 percent; and

Mexico's to 0.36 percent [22].

With the dramatic depreciation of the dollar, a steel imports restriction agreement with major exporters to the United States has brought some relief to domestic steel makers. ENR reported that, according to the American Iron & Steel Institute, foreign steel accounted for 30 percent of the United States market in late 1984. By September 1986, the penetration rate was down to 22 percent [ENR Nov.27, 1986 P31].

e) Exporters' response to the U.S. market

Total steel mill output in the United States is shown in Table 4-6. The quantity of domestic product shipments has been decreasing gradually after 1981 when it recorded 88.5 million net tons. The quota agreement of the United States with other countries was intended to keep the share of imports lower than that of 1984. However, this quota offers some protection to Japanese steel mill producers, who recently suffered from the high exchange rate after the Group Five meeting (the U.S., West Germany, Japan, Britain, and France) in Tokyo in 1985. Japan shifted its exports to the United States to high-class steel products such as surface-treated plates and seamless pipes which the newly industrialized countries (NICs) cannot produce yet [ENR Nov.27, 1986 P31].

Table 4-6

Steel mill product shipments in the U.S.

million net tons

\Year	1975	1980	1981	1982	1983	1984	1985
Raw steel production	116.7	111.8	120.8	74.6	84.6	92.5	93.0
Steel mill product shipment	80.0	83.9	88.5	61.6	67.6	73.7	74.0
Exports	3.0	4.1	2.9	1.8	1.2	1.0	0.9
Imports	12.0	15.5	19.9	16.7	17.1	26.2	23.0
Apparent consumption	89.0	95.3	105.5	76.5	83.5	98.9	96.1

Source : [22]

Tables A-5,A-6 in the appendix show detailed information about the shipment and trade of concrete reinforcing bars in the U.S.

4-3 Lumber

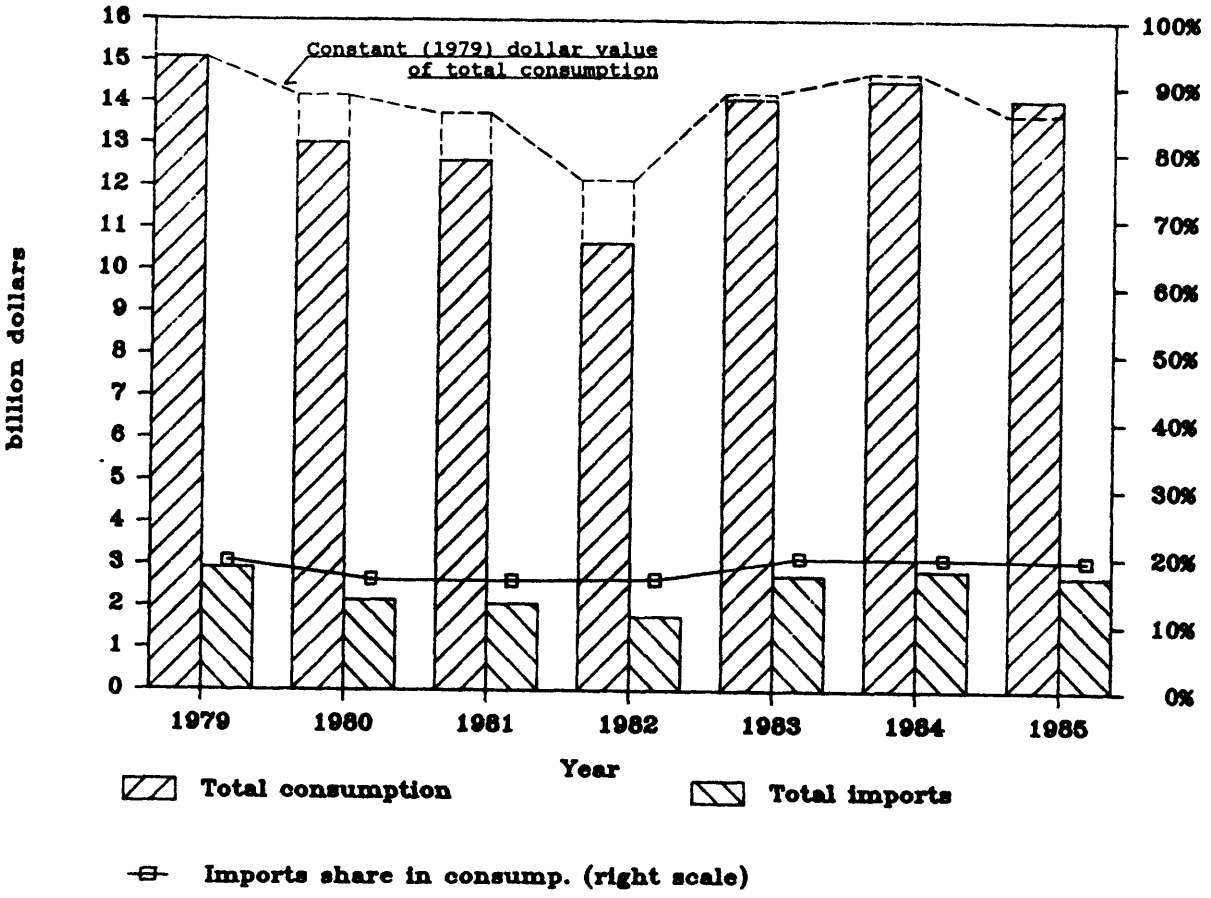
The lumber industry is the largest segment of the solid wood products industry, accounting for about 52 percent of the total value of shipments and more than 50 percent of the employment in the solid wood products industry [22]. According to the U.S. Government Census of Manufacturer in 1982, there are 5,810 companies and 6,316 establishments in the U.S. [15].

a) Total lumber consumption and total imports

Figure 4-8 shows the total consumption and the total imports of lumber in the United States. The total consumption of lumber in the United States is affected by fluctuations in residential construction investment, because the residential construction industry is the largest single consumer of lumber. The dollar value of total imports of lumber has been between 16 percent and 20 percent since 1979. While the United States is reported to be the second largest lumber producer after the USSR, the United States is also the largest importer of lumber in the world. Canada has been the largest lumber exporter to the United States. According to the International Trade Administration, the United States imported 21.8 million cubic meters of lumber in 1981 and 98.6 percent of it came from Canada. The Current Industrial Reports indicates that in terms of volume figures, imports constituted 33 percent of the total consumption in the United States in 1984 and 33.3 percent in 1985 [28].

Figure 4-8

Lumber in the U.S. :
Total consumption and imports



Source : [22]

b) Imports from Japan

According to the Department of Commerce, lumber imports from Japan have been very small. For example, in 1985 only $334,000 of softwood lumber and $475,000 of hardwood were imported into the United States from Japan [24].

c) Effect of imports

Historically, lumber prices have been volatile following

the cyclical movement of residential construction investment and supply. The large amount of lumber imports from Canada suppressed prices in the United States. However, in 1986 the price of lumber increased for three reasons: (1) residential construction investment increased rapidly, (2) Canadian supplies decreased because of a strike at British Colombian lumber mills, and (3) a 15 percent surtax was imposed on imported lumber from Canada. ENR reported that National Association of Home Builders estimated that if the 15 percent tariff holds, the cost of an average home will increase by $1,000, and could price 300,000 families out of the housing market [ENR Dec. 18, 1986 p37].

d) U.S. manufacturers' response

Major factors in the competitiveness of foreign lumber include lower wood and labor costs, and favorable currency exchange rates. Canadian lumber flooded the United States market for two additional reasons: (1) over-capacity created an over-supply of lumber, and (2) depressed residential construction investment in the world created an over-supply of lumber. Fair Lumber Imports, an organization representing the U.S. lumber industry, filed a petition requesting a countervailing duty investigation of certain softwood lumber products from Canada. The Department of Commerce determined in October 1986 that Canadian pricing practices for harvesting soft wood timber constituted a 15 percent subsidy and, therefore, the 15 percent surtax mentioned above was imposed.

e) Exporters' response

As mentioned before, Japan is exporting very little lumber to the United States. It is obvious that lumber is a very low value-added material and that Japan does not have enough wood resources to export. The raw materials for Japanese manufactured products come from abroad; therefore, Japanese exports of solid wood products are mainly plywood, which has a higher value-added than does lumber. Plywood will be discussed further in section 4-4.

Table A-7 in the appendix shows lumber shipment and trade of the U.S.

4-4 Plywood

Two main types of plywood are produced : soft plywood, which is made from softwood and used mainly for construction purposes; and hard plywood, which is made from hardwood and used mainly for interior and furniture purposes. The United States is the largest producer of plywood (Table 4-7).

Table 4-7

Plywood world production

millions cubic meters

	1970	1976	1979	1981
United States	14.1	16.7	17.1	14.8
Canada	1.8	2.4	2.5	2.1
Japan	6.9	7.1	8.5	7.1
Korea	0.8	1.7	2.3	1.6
China (T)	0.8	1.2	1.5	1.3
Indonesia	0.0	0.2	0.6	1.5
Malaysia	0.2	0.5	0.5	0.5
Philippines	0.6	0.4	0.5	0.4
USSR	2.0	2.2	2.0	2.0
Finland	0.7	0.5	0.6	0.6
France	0.6	0.6	0.5	0.5
Italy	0.4	0.4	0.4	0.5
All others	4.3	4.9	5.3	5.1
World total	33.2	38.8	42.3	38

Source : [29]

ENR reported that despite a price increase in plywood during first three quarters of 1985, there was a sudden plunge in the fourth quarter. However, ENR also reported in June 1986 that a surge in homebuilding, triggered by falling mortgage rates in 1986, has caused an increase in plywood

prices in the United States, which did not disappear even at the end of 1986 [ENR Dec.18, 1986 p46].

4-4-1 Soft plywood

According to the Census of Manufacturers [15] in 1982 there were 268 companies and 306 establishments in the soft plywood manufacturing industry in the United States [15].

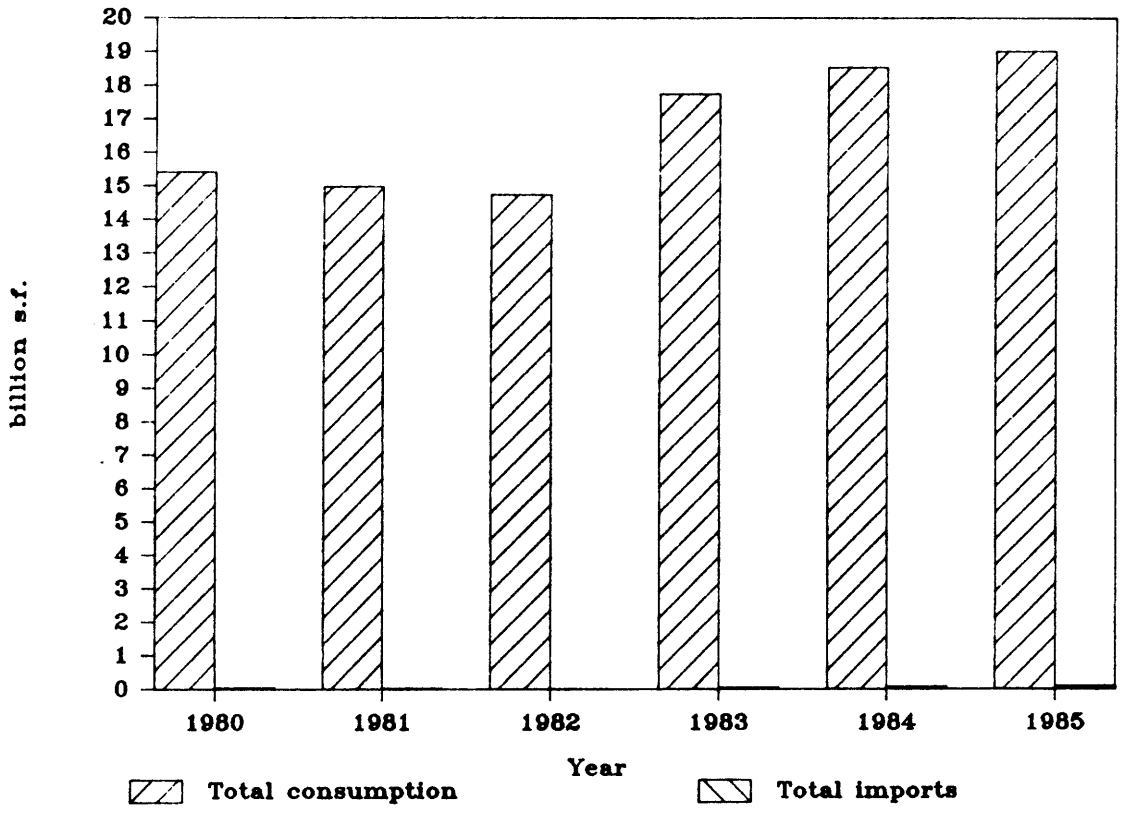
a) Total consumption and total imports

Figure 4-9 shows the quantity of total consumption and total imports of soft plywood in the United States. Figure 4-10 shows the value of total consumption and total imports of soft plywood. Figure 4-10 reflects the total construction investment in terms of dollar value figures. These two figures together indicate that the price dropped in 1982 because of the competitive environment created by the recession. (There was a bigger drop in consumption value than in quantity.)

The value of total imports of soft plywood by the United States has been less than one percent of that for total consumption (Table A-8 in the appendix). The value of total exports has been around three percent of that for total shipments of domestic manufacturers, and is decreasing gradually. These figures indicate that the United States is the biggest soft plywood producer for its own consumption. The main exporters of soft plywood to the United States are Canada, Indonesia, and the Philippines.

Figure 4-9

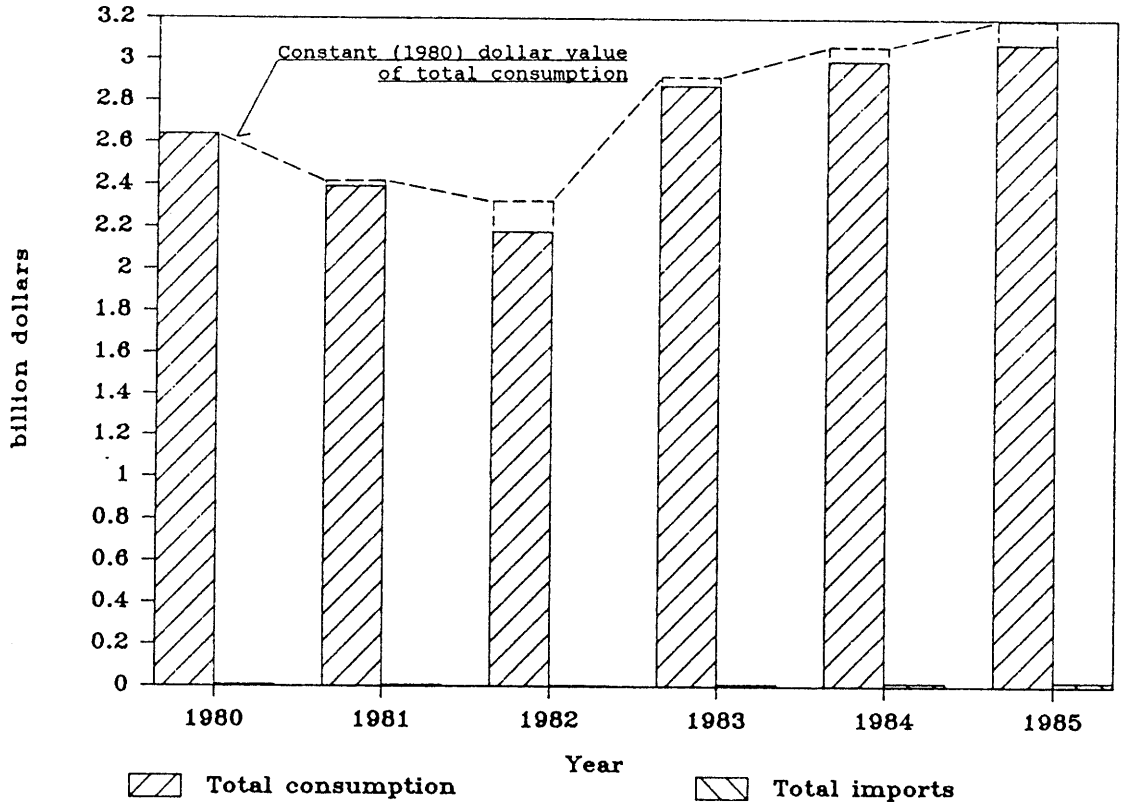
Soft plywood in the U.S.:
Total consumption and imports in quantity



Source : [28]

Figure 4-10

Soft plywood in the U.S. :
Total consumption and Imports in value



Source : [28]

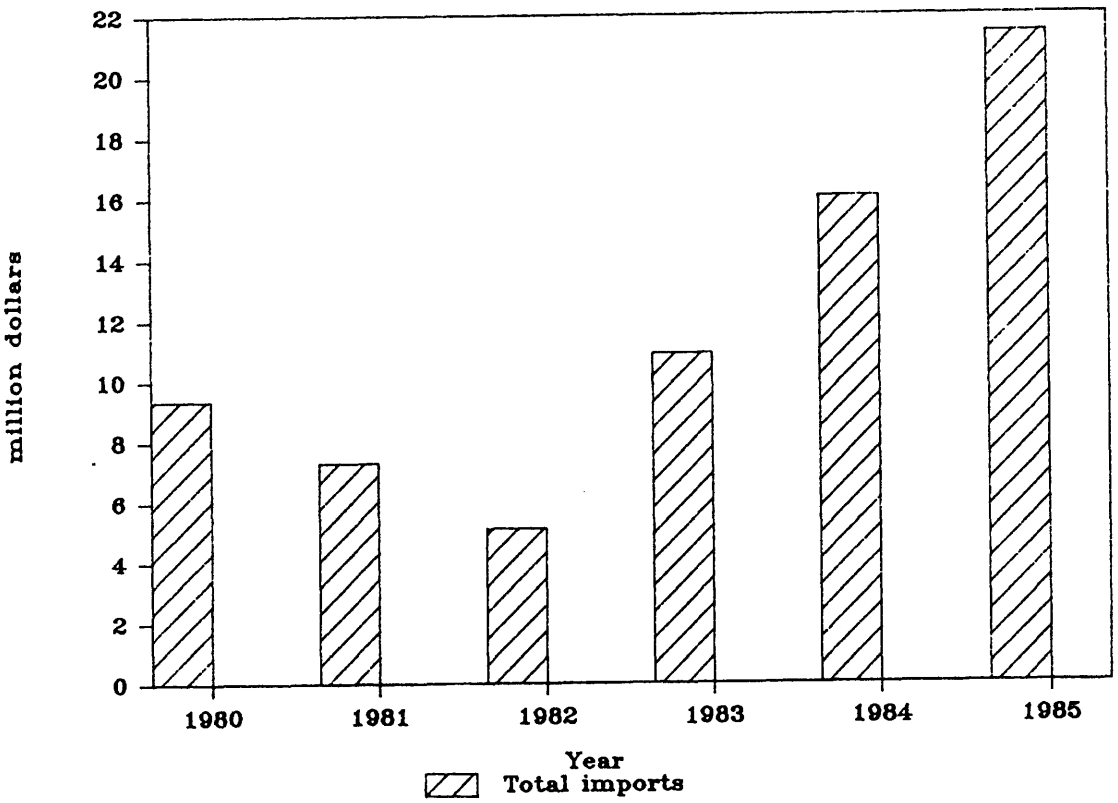
b) Effect of imports

Imports are currently not having much effect on the prices of plywood in the United States because of the relatively small volume of imports compared to total consumption (Figure 4-11).

Tables A-8, A-9 in appendix show detailed information on the shipment and trade of soft plywood in the U.S.

Figure 4-11

Soft plywood in the U.S. : Total imports



Source : [24]

4-4-2 Hard plywood

a) Total consumption and total imports in the U.S.

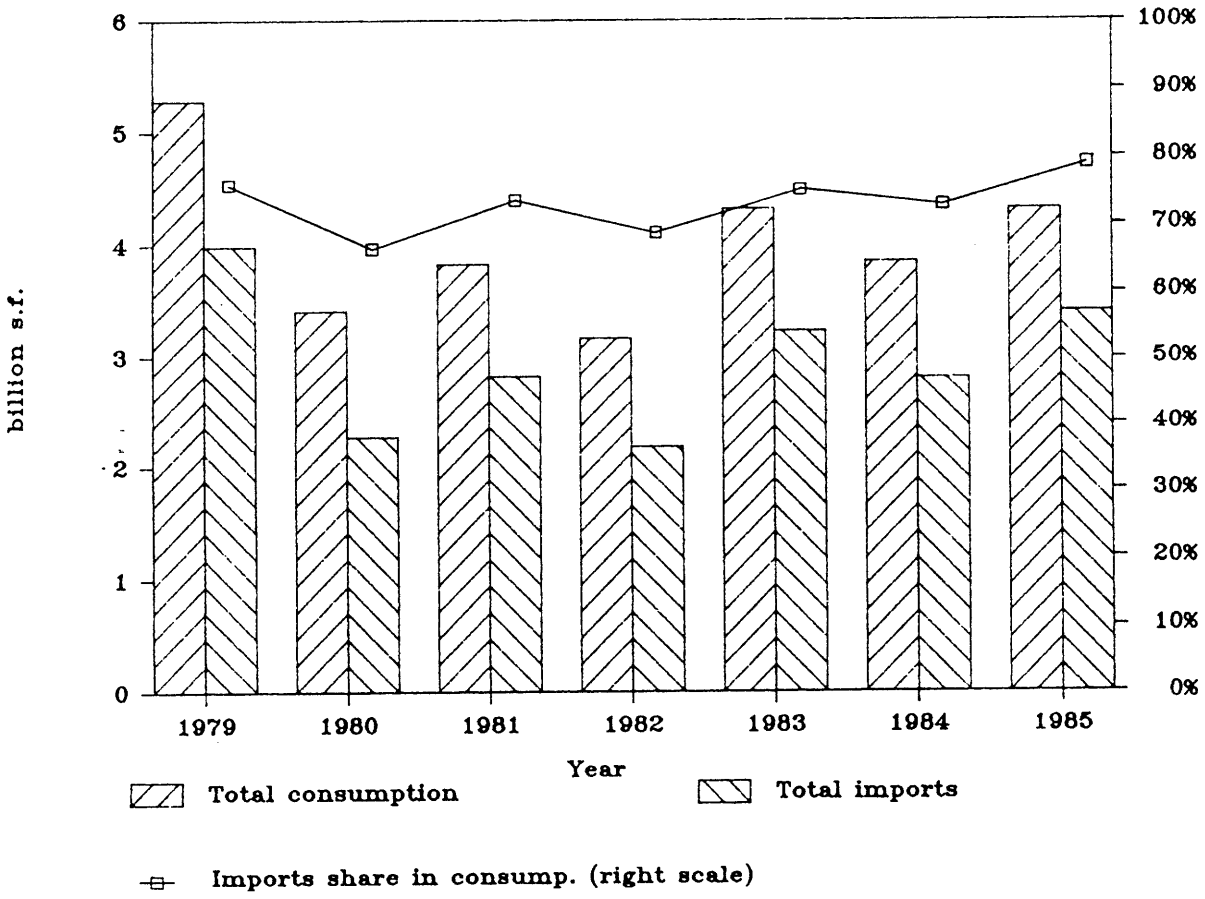
Figure 4-12 shows, in quantitative terms, total consumption and total imports of hard plywood in the United States. This figure shows peculiar movements, such as a sudden increase in 1981 and a sudden decrease in 1984; these fluctuations do not seem to fit the movement of the total construction investment in the U.S.

Figure 4-13 shows the total value of consumption and the total imports of hard plywood in the United States, revealing the fact that the value of hard plywood consumption in 1984 actually followed the movement of total construction investment, unlike the peculiar movements of the quantity figure. (The consumed quantity actually went down, but its value went up.) However, Figure 4-13 still does not explain the quantitative movement of total consumption in 1981. The value of consumption also went down in 1985 despite the increase in construction investment.

Figure 4-12 and 4-13 positively suggest that hard plywood consumption does not depend on construction investment in general, but rather on some specialized segments of the construction industry such as high-quality office, luxury residence, mobile home, and furniture construction.

Figure 4-12

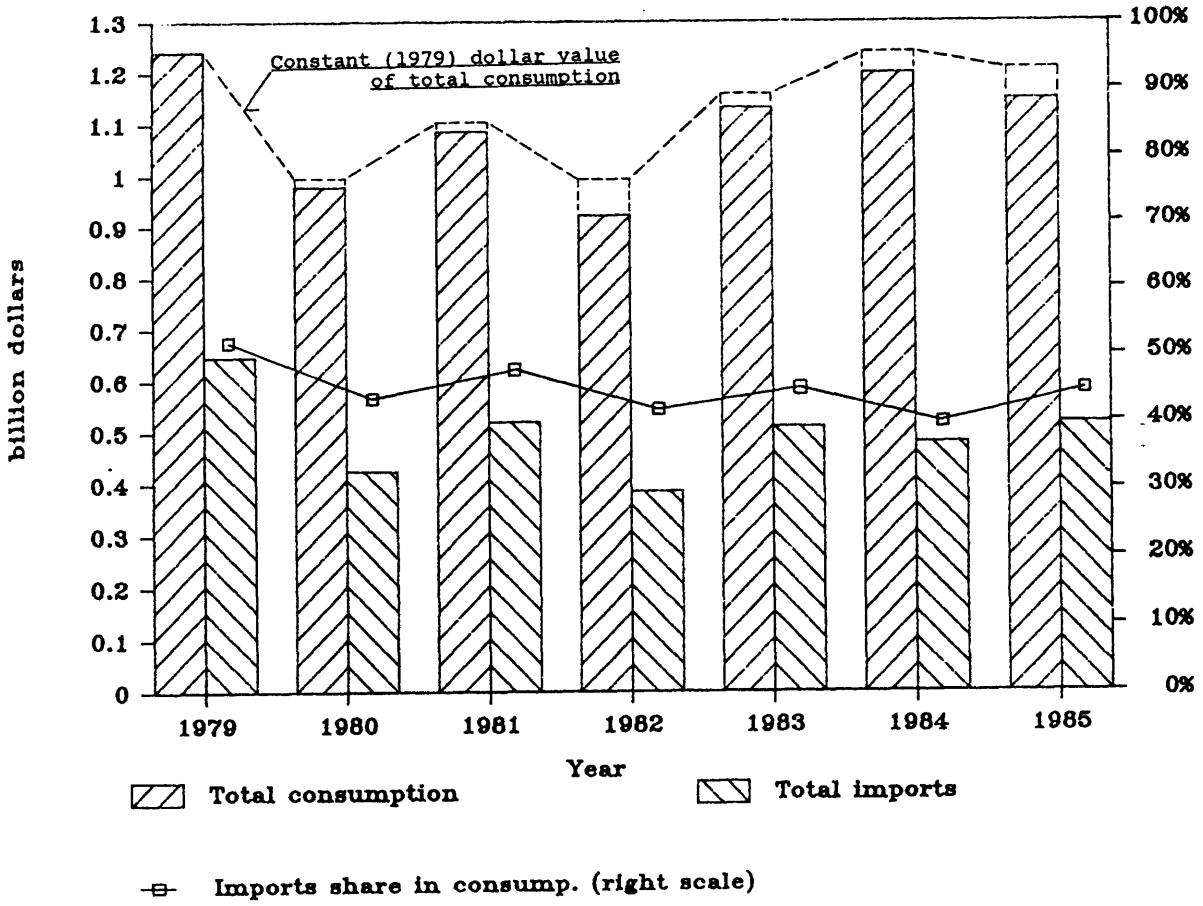
Hard plywood in the U.S. :
Total consumption and total imports in quantity



Source : [28]

Figure 4-13

Hard plywood in the U.S. :
Total consumption and total imports in value



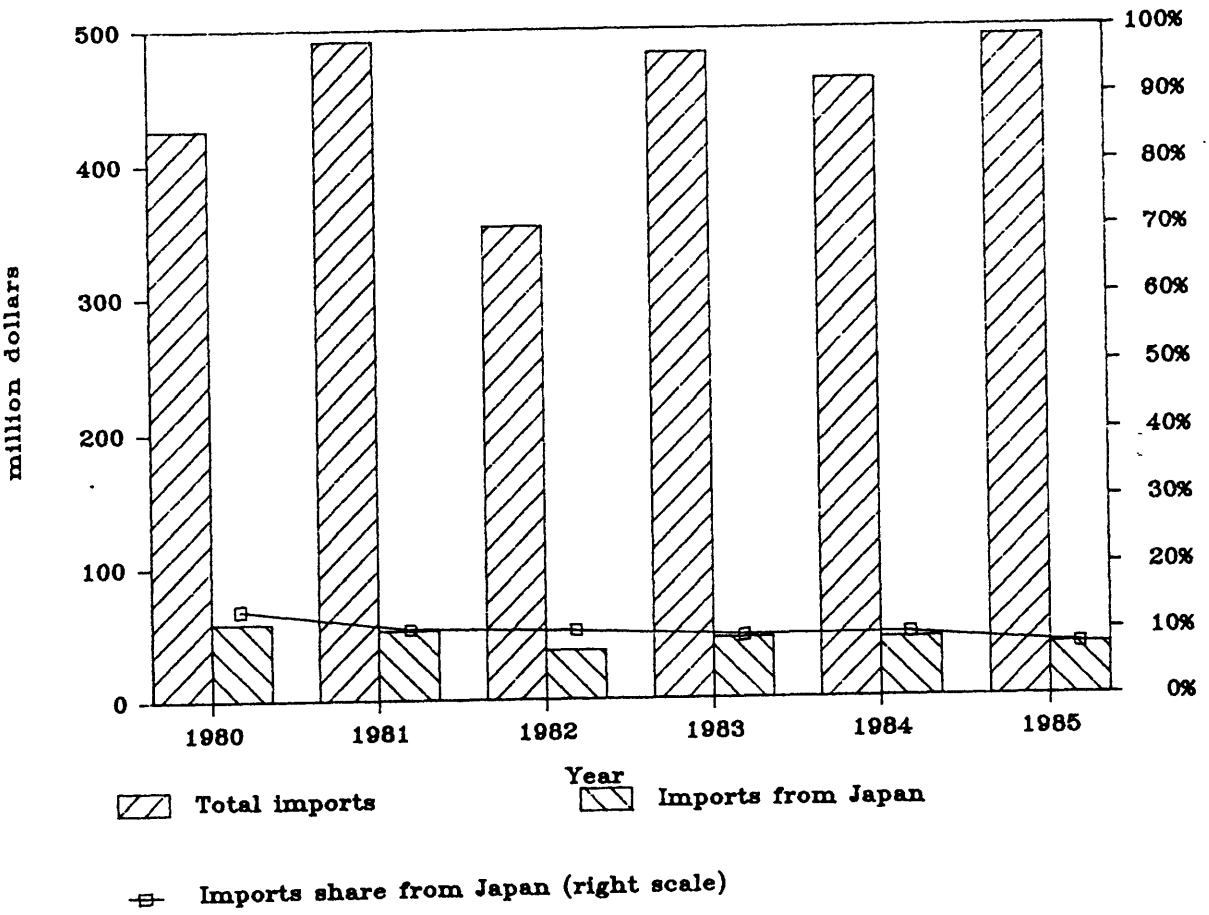
Source : [28]

b) Imports from Japan

Figure 4-14 shows the total U.S. imports and imports from Japan. The share of imports from Japan exceeded 10 percent until 1982, but its share has been decreasing gradually, mainly because of policy changes in developing countries such as Indonesia, which used to export large amounts of raw hardwood to foreign countries but decided to reduce such exports in favor of processed products.

Figure 4-14

Hard plywood in the U.S. :
Total imports and imports from Japan



Source : [24]

c) Effect of imports

Figure 4-12 as well as Figure 4-13 shows that the United States imports large amount of hard plywood. The quantitative share of imports in total consumption has been between 66 and 79 percent, while the share of imports in value has been between 40 and 52 percent. It can be said that the U.S. hard plywood market is dominated by low-priced imports. Recently, the original soft plywood manufacturing companies

in the United States have been trying to diversify in to the production of hard plywood.

d) U.S. manufacturers' response

U.S. Industrial Outlook reports that, as some soft plywood manufacturers try to upgrade their product mixes, over-production of hard plywood is increasing in the United States.

e) Exporters' response

Foreign hard plywood manufacturers formed a sellers' cartel in Indonesia and are trying to further penetrate the processed hard plywood products market in the United States.

Tables A-10, A-11 in the appendix show detailed information of hard plywood shipment and trade in the U.S.

4-5 Clay construction material

4-5-1 Brick

According to the International Trade Commission (ITC), there were 195 companies at 294 plants during the time from 1981 to 1984 [30].

a) Total consumption and total imports in the United States

Figure 4-15 shows total consumption and total imports of brick in the United States. Brick consumption in the United States increased from $545.8 million in 1980 to $852 million in 1985. The consumption of brick did not fluctuate as much as residential construction investment in 1982 and 1983. Instead, its movement seems to follow total construction investment. This does not necessarily mean that brick consumption does not depend on residential construction, but rather that brick is so popular a material that it is used in every type of construction.

b) Constraint on the importation of brick

Imports of brick are a very tiny part of total consumption, and decreased gradually from 2.4 percent in 1981 to 0.9 percent in 1985. A large proportion of the imports came from two neighboring countries: Canada and Mexico.

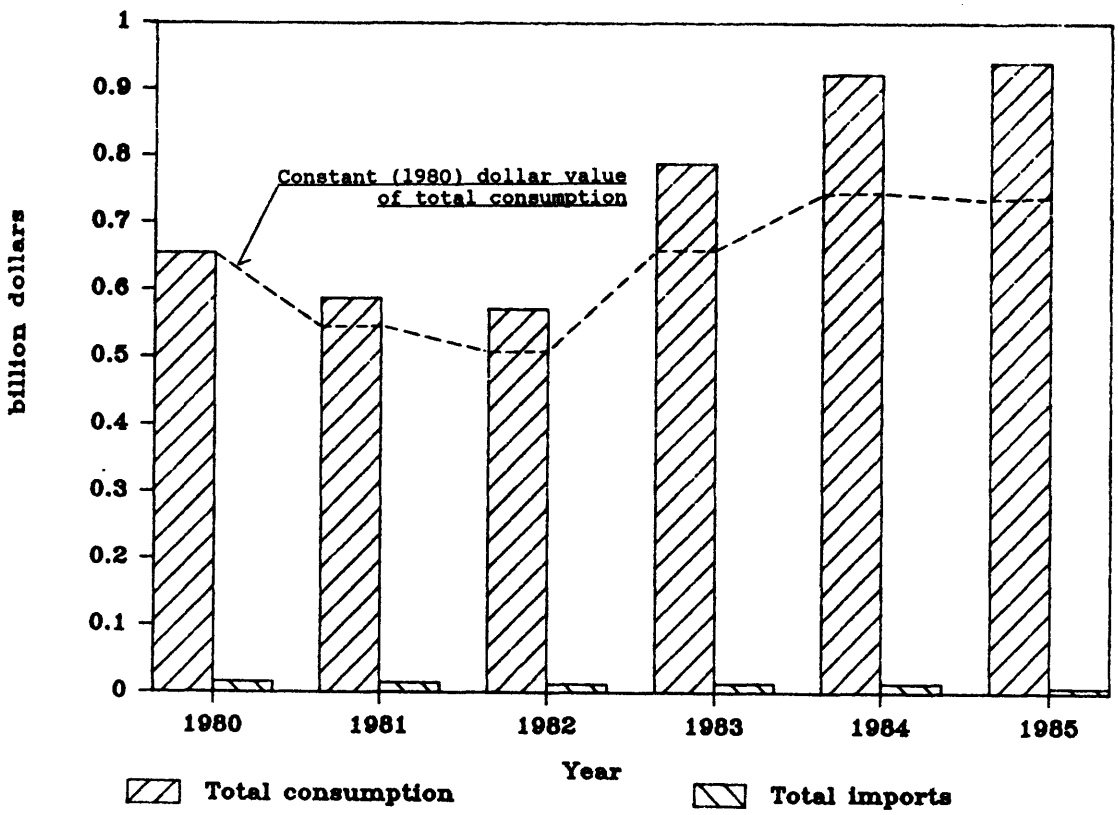
The transportation cost of this material (low value, high weight item) tends to limit international trade. With the exception of goods from Canada and Mexico, import charges

other than duty (e.g. freight and insurance) incurred in transportation to the United States represent an estimated 44 percent of the import value of such merchandise [30]. Therefore, most of the brick in the market is domestically produced.

Table A-12 in the appendix shows detailed information about shipment and trade.

Figure 4-15

Brick in the U.S. : Total consumption and total imports



Source : [24]

4-5-2 Ceramic floor and wall tile

Ceramic floor and wall tile are thin surfacing units made of non-metallic minerals; they are used as decorative veneers on floors and walls. There are three major categories of tiles: mosaic tile, glazed nonmosaic tile, and unglazed nonmosaic tile.4/ Tiles are used on different surfaces and for different purposes depending on their characteristics. Glazed tile is the most expensive and can be used for interior and exterior application, except for floors subject to heavy traffic. Unglazed tile is less expensive and is preferred for floors subject to heavy traffic.

There were 61 companies and 79 manufacturing plants within the ceramic floor and wall tile industry in 1982. It is reported that the production of mosaic tile in the United States is principally confined to unglazed non-specialties, which are not imported in significant volume and represent less than four percent of the quantity of total U.S. imports of mosaic tile in 1982 [31]. In other words, U.S. manufacturers are not in competition with imported tile producers. Instead, they try to integrate domestic products with imported tile. This assumption is supported by the fact that U.S. producers imported a significant amount of tile for domestic competition [31].

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4 Mosaic tiles have a facial area of less than six square inches.

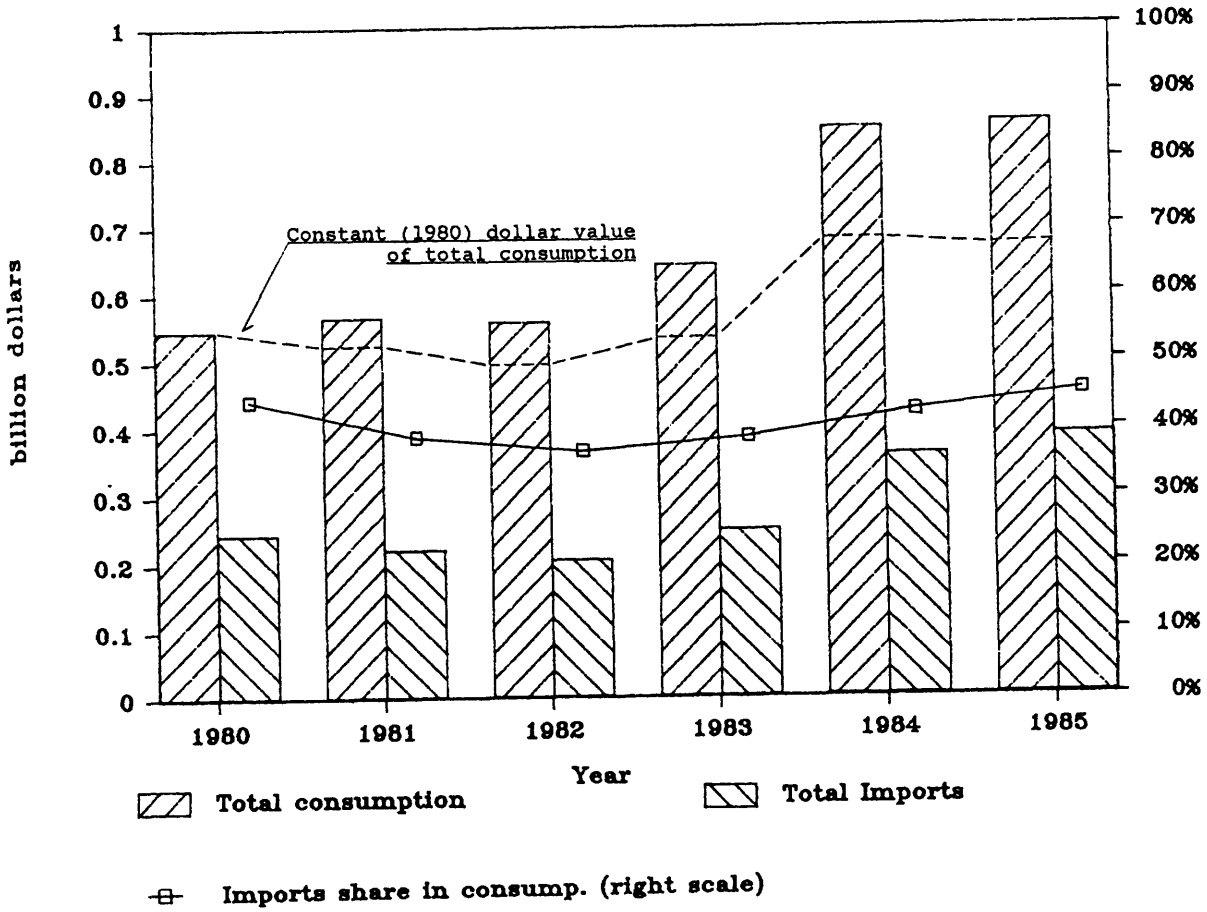
a) Total consumption and total imports

Figure 4-16 represents total ceramic floor and wall tile consumption and imports in the United States. Like brick consumption, it is obvious that ceramic floor and wall tile consumption depends on total construction investment rather than on residential investment only. This indicates that ceramic floor and wall tile is used as commonly as brick in many types of construction.

Ceramic floor and wall tile is one of two major construction materials investigated in this thesis, which show that more than half of the total quantity consumed in the U.S. is imported from foreign countries (Table A-13 in the appendix). (Another material of which more than half has been imported is hard plywood.) Imported tile's share in value was relatively constant between 1980 and 1985. Its share in value was 44.6 percent in 1980, slowed down with the total consumption and reached 45.2 percent in 1985. However, its share in quantity indicates was larger. It decreased only one time during the 1980s (in 1983), and increased vigorously in 1984 and reached 58 percent in 1985 (Table A-13 in the appendix).

Figure 4-16

Ceramic floor and wall tile in the U.S. :
Total consumption and total imports



Source : [24]

b) Imports from Japan

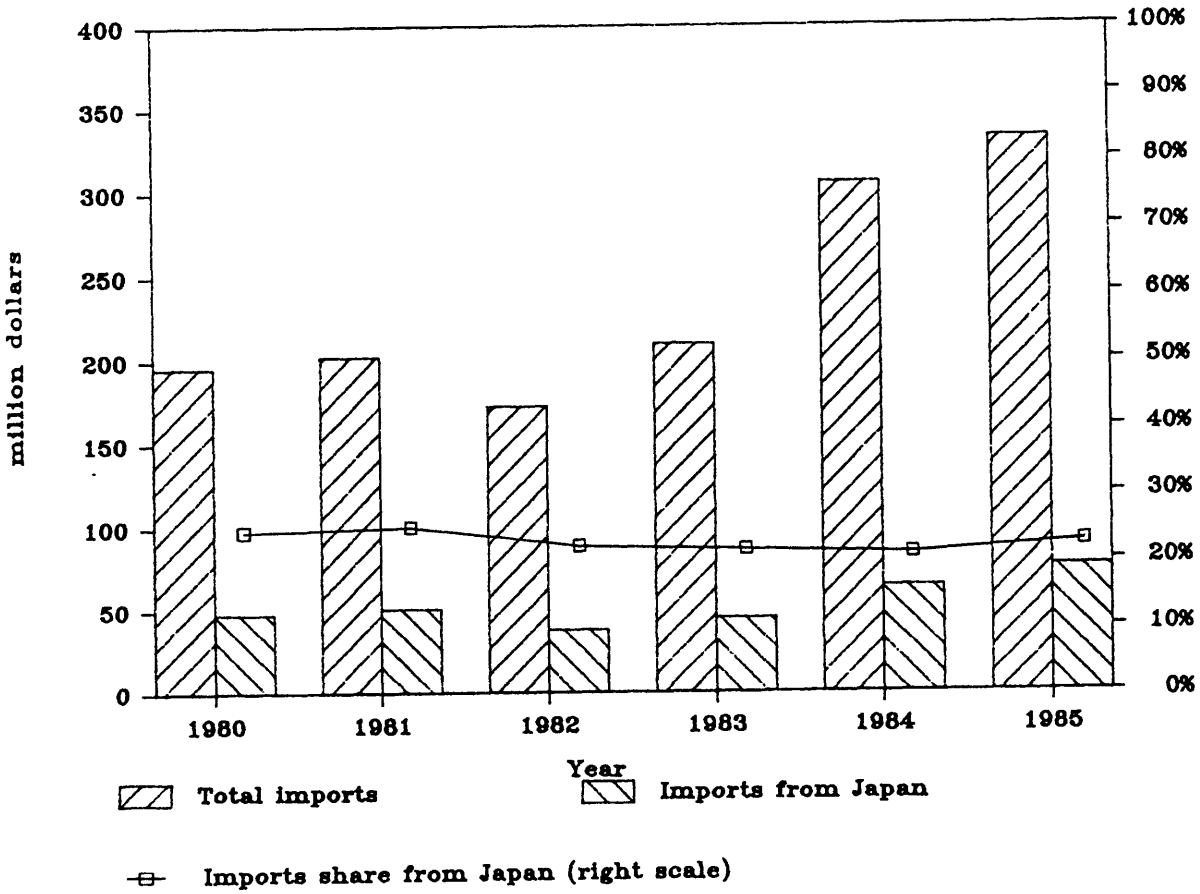
Japan is the second largest exporter of ceramic floor and wall tile to the United States, following Italy. According to the import statistics of the Department of Commerce, the Japanese share in total tile imports was 24.4 and 25.3 percent in 1980 and 1981 respectively. However, tile imports from Japan dropped in value in 1982 when its share of total imports dropped down to 22.1 percent. After

that, although its value increased 19, 42, and 18 percent over the previous year's value in 1983, 1984 and 1985 respectively, its share of total imports remained about 22 percent. This means that other countries increased their share of the total imports to the United States.

These countries are Italy, Spain, and China. Figure 4-17 shows the total imports and imports from Japan of ceramic floor and wall tile.

Figure 4-17

Ceramic floor and wall tile in the U.S. :
Total imports and imports from Japan



Source : [24]

c) Effect of imports

According to Table 4-8, the average price of domestic tile in the United States was $0.86 per square foot in 1978 increasing to $1.2 per square foot in 1982. However, the average price of imported tile was $0.65 per square foot in 1978, increasing to $0.9 per square foot on C.I.F. on an imports duty paid basis in 1982. U.S. tile manufacturers believe that the low price of imported tile is the main reason for its big share in the total consumption in the United States. However, Table 4-8 shows that the price of tile from Japan has been almost the same as that of domestic tile. Therefore, there must be other reasons why the value of high-priced imports such as Japanese tile has increased constantly.

Table 4-8

The average price of ceramic floor and wall tile in the U.S. 1/

dollar per square foot
(import price on C.I.F. duty-paid basis)

Year	U.S. tile	Total imports	Japan
1978	0.86	0.65	0.80
1979	0.95	0.74	0.81
1980	1.04	0.94	1.02
1981	1.19	1.02	1.18
1982	1.20	0.90	1.00

1/ Because of the product difference between U.S. tile and imported tile, the average price difference does not reflect the actual price difference.

Source : [31]

d) U.S. manufacturers' response

As previously explained, the ceramic floor and wall tile market depends on total construction investment, and domestic producers handle imported tile because of fierce competition among domestic tile manufacturers and other foreign manufacturers. Domestic producers are handling imported tile for three reasons. First, as mentioned before, the price difference between domestic products and imported tile makes imports very attractive to consumers. Second, consumers of the tile have diversified preferences in tile quality, color, and design. Therefore, manufacturers must carry many types of tiles to meet all needs. Finally, it is reported that foreign manufacturers are spending extensive amounts on marketing to expand their share in the U.S. market [31]. Therefore, many customers have additional information about imported tile designed to be attractive to them.

e) Exporters' response

Like the cement industry, foreign ownership in the tile industry of the United States has been increasing even in the early 1980s. By 1982, five companies and eight plants had come under the control of foreign interests and accounted for more than 20 percent of the U.S. producers' shipment in 1982 [31]. Foreign exporters are also spending a considerable amount of money on marketing in the United States in order to expand their sales.

Tables A-13, A-14 in the appendix show detailed information about tile shipment and trade in the U.S.

4-6 Flat glass

There were 49 companies and 69 establishments in the United States' flat glass industry in 1982. Their products are (1) Ribbon glass; (2) Rolled or cast glass; (3) Drawn or blown flat glass; (4) Wire glass; (5) Plate and float glass; (6) Edged glass strips; (7) Processed flat glass5/; (8) Tempered or toughened glass; (9) Laminated glass; (10) Multi-glazed glass units; and (11) Painted, colored, or stained glass windows [33]. About one third of all flat glass shipments go to the construction market, and close to 60 percent go to the automotive market [32]. The first five kinds of glass in the list above are called basic flat glass products. A certain portion of basic glass products are used for further processing to produce processed flat glass such as tempered glass and toughened glass.

The production of basic flat glass in the United States is highly concentrated, with most of the production by five large companies [32]. Another 44 companies are constituted as flat glass fabricators which make processed flat glass products from (7) to (11) listed above.

5/ This is a narrow definition for a certain glass product. This thesis will use "processed flat glass" to mean all products from (7) to (11).

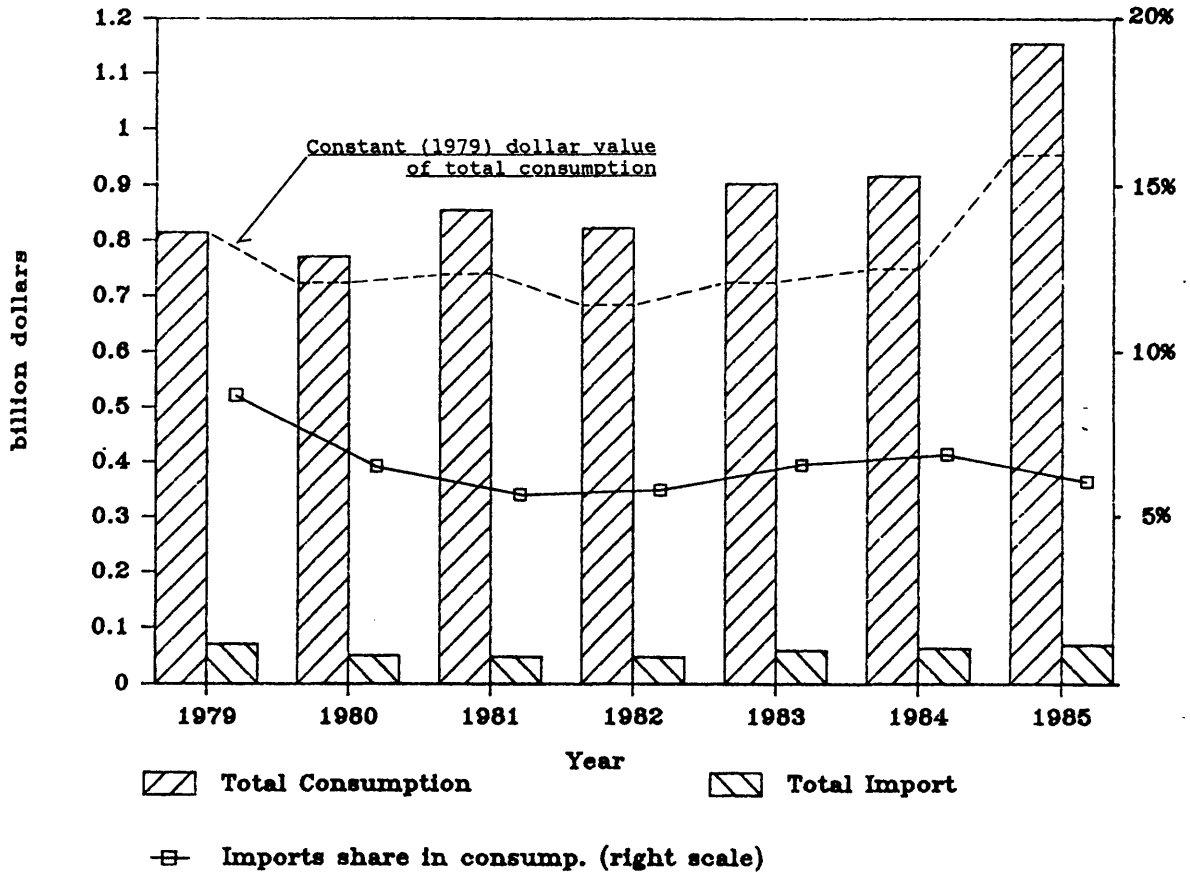
a) Total consumption and total imports

Figure 4-18 shows the total consumption of basic flat glass and total imports in the United States, and Figure 4-19 shows total consumption and total imports of flat glass (basic and processed) in the United States. Because the consumption of flat glass depends not only on the construction industry but also on another big consumer, the automobile industry, the consumption of basic flat glass as well as flat glass is more stable than that of the new construction investment put in place. In describing the flat glass market in the United States, the United States International Commission reports, [33]

> The flat glass industry is a cyclical industry, heavily affected by economic conditions in the primary construction and automobile industries, the two large users of flat glass. A third major user of flat glass is secondary construction, which includes building repairs and remodeling. Because this industry is less cyclical than the automobile and primary construction industries, steady demand partially offsets swings in demand for flat glass by the major users.

Figure 4-18

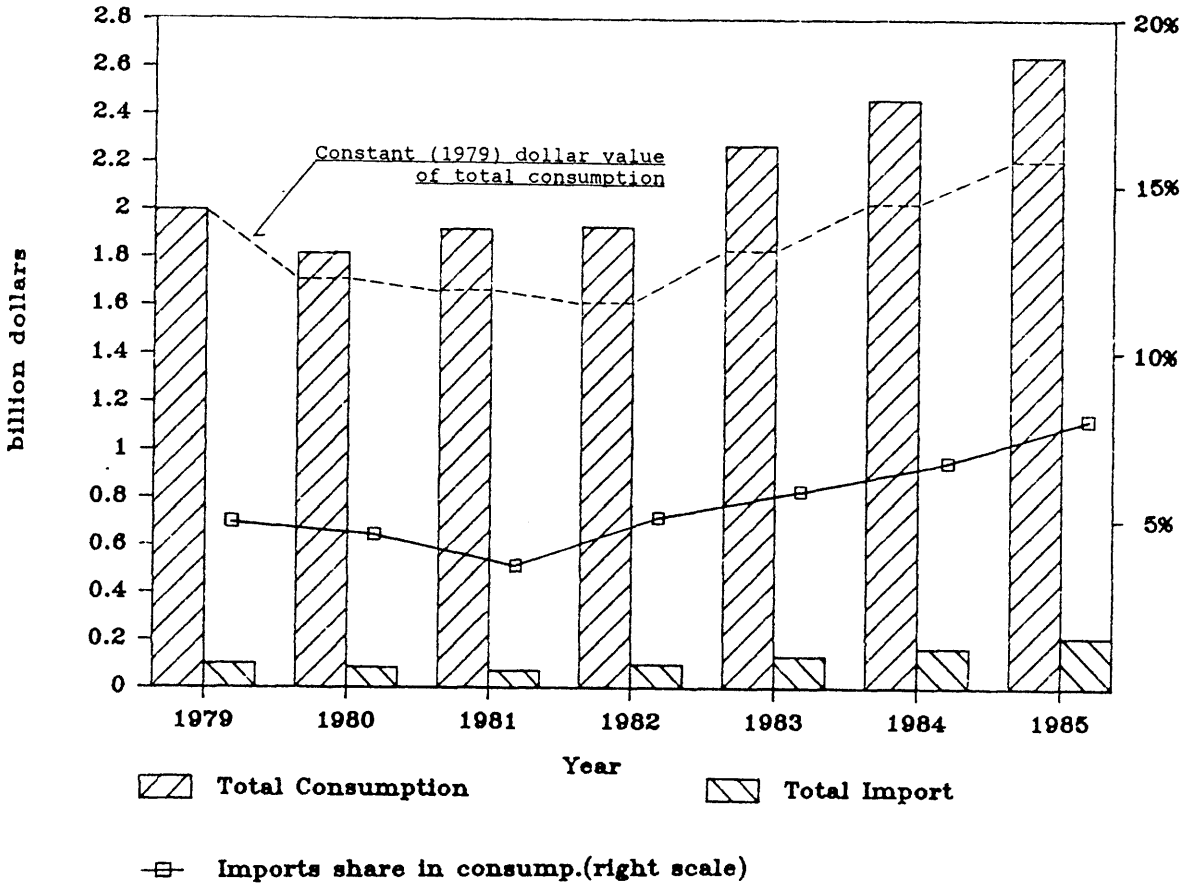
Basic flat glass in the U.S.:
Total consumption and total imports



Source : [28]

Figure 4-19

Flat glass in the U.S. : Total consumption and total imports



Source : [22]

b) Imports from Japan

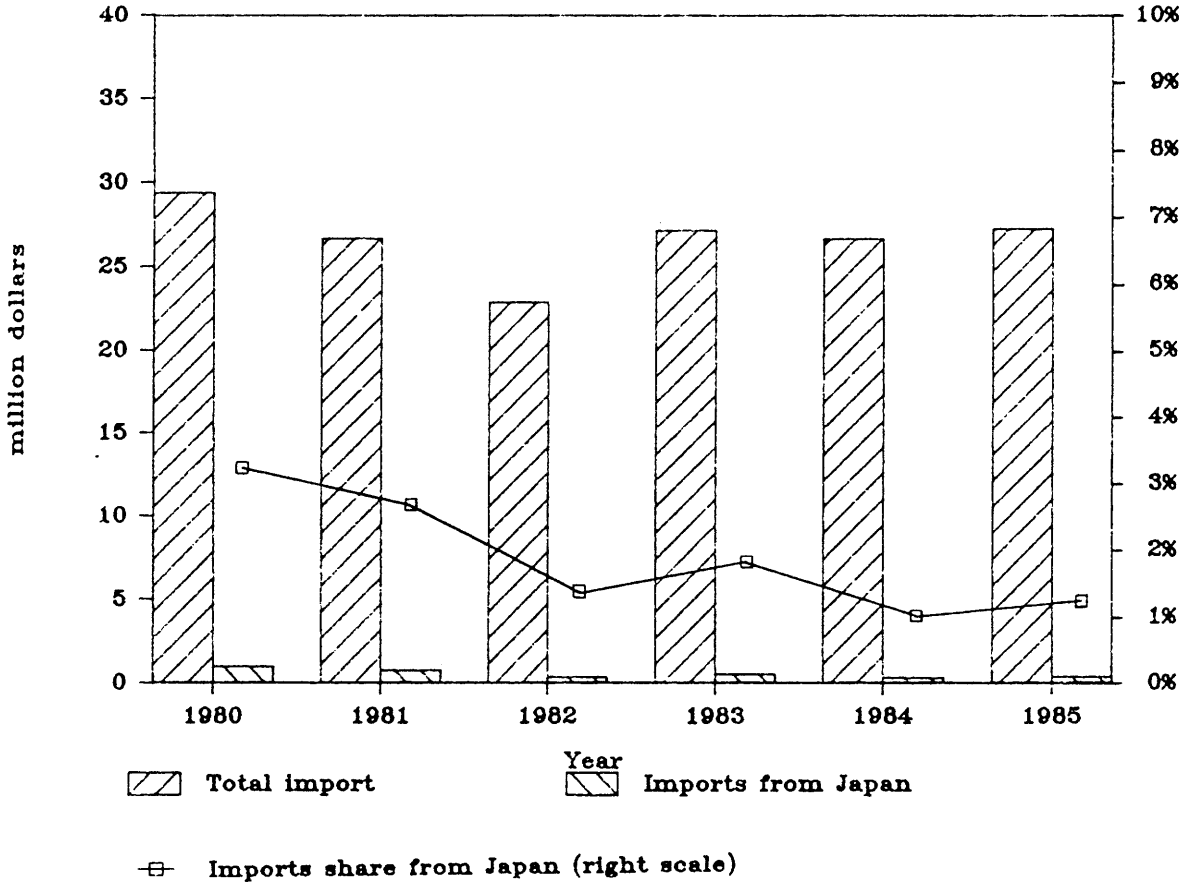
Figure 4-20 shows the total imports and imports from Japan of basic glass (except wire glass). Figure 4-21 shows the total imports and imports from Japan of wire glass. Figure 4-22 shows the total amounts of imported toughened and laminated glass as well as its imports from Japan. These three figures reveal the following facts about flat glass

imports from Japan.

First, the imports from Japan of basic flat glass products other than wire glass, which are very low value-added products, decreased for six years. Second, the imports from Japan of wire glass, which is a higher value-added product than other basic flat glass but a lower value-added product than processed glass, has been relatively constant but its share has decreased in the total imports. Finally, the imports from Japan of processed flat glass, such as toughened and laminated glass, which are the highest value-added products of all flat glass products, have increased rapidly but its share has still decreased in total imports to the U.S.

Figure 4-20

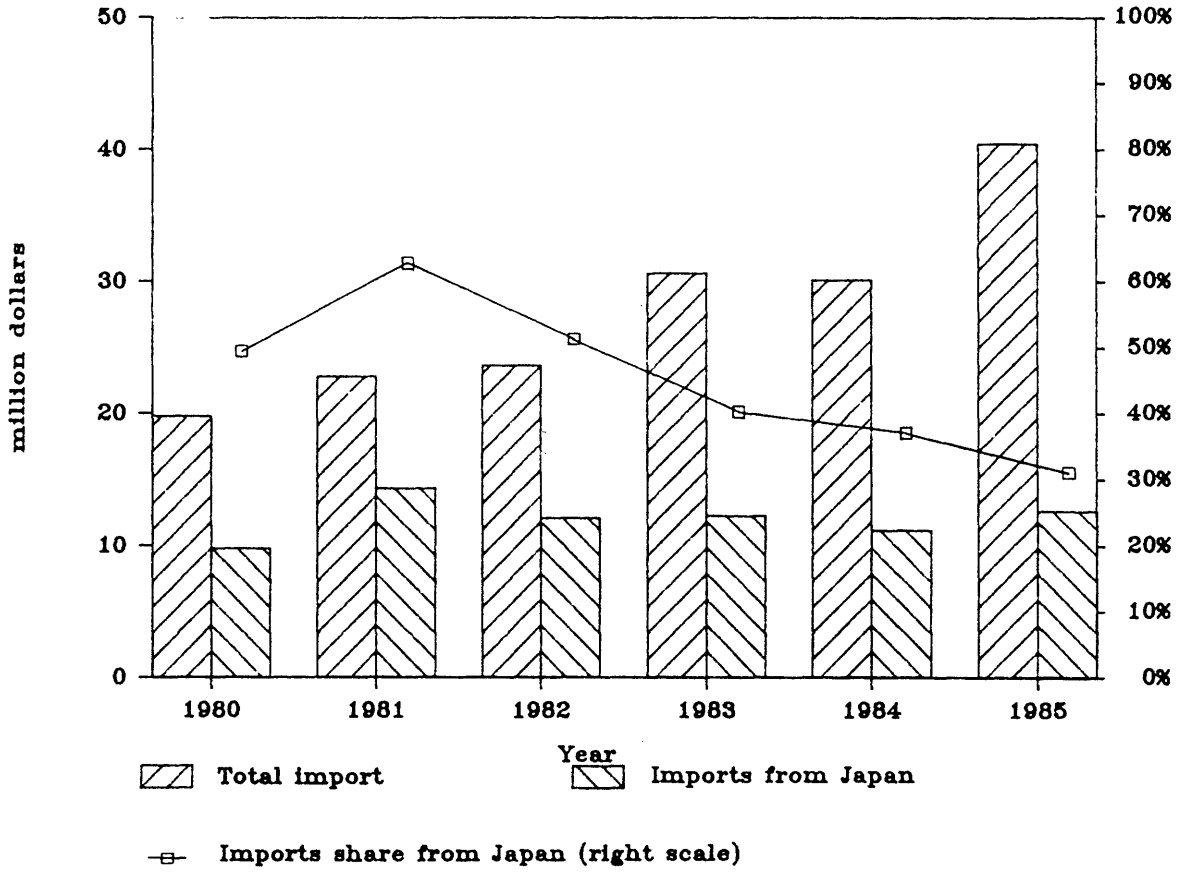
Basic flat glass (except for wire glass) in the U.S. :
Total imports and imports from Japan



Source : [24]

Figure 4-21

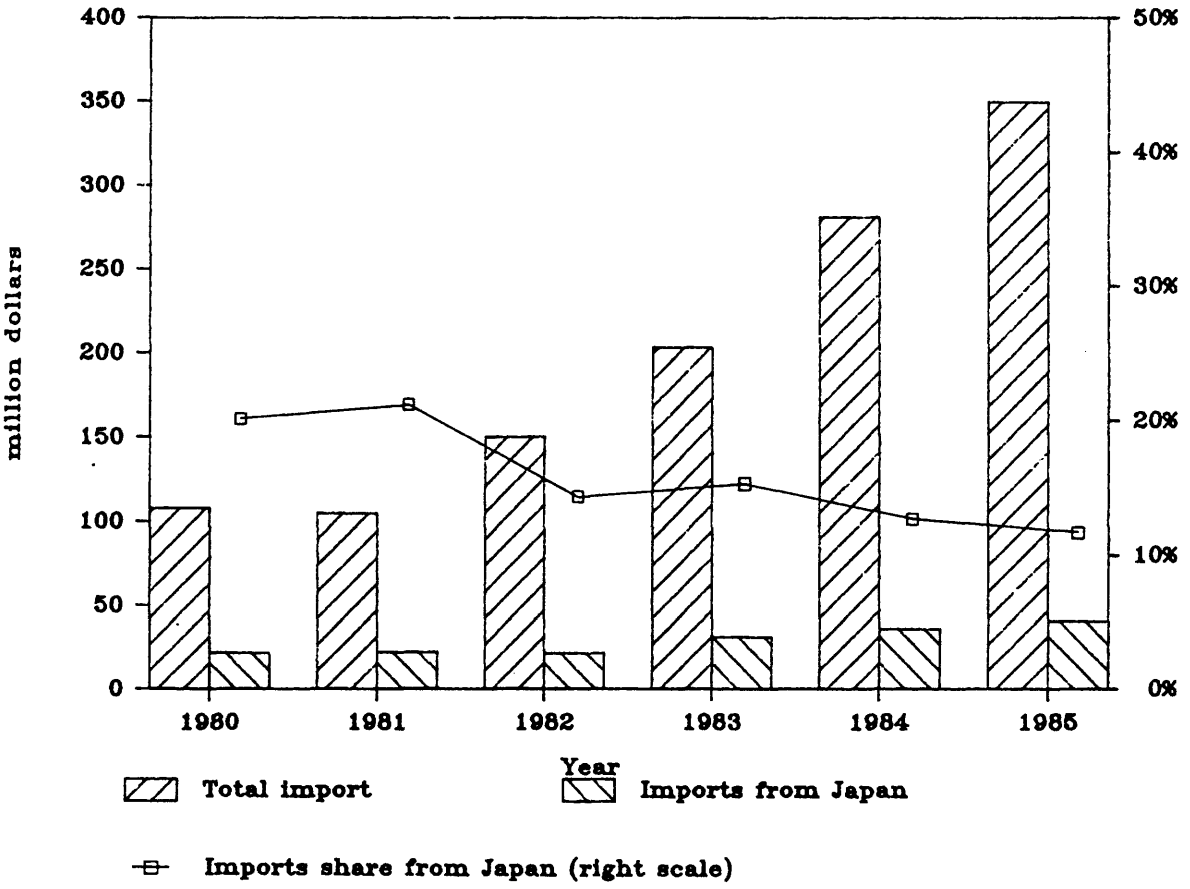
Wire glass in the U.S. : Total imports and imports from Japan



Source : [24]

Figure 4-22

Processed glass in the U.S. :
Total imports and imports from Japan



Source : [24]

c) Effects of imports

Comparing Figures 4-18 and 4-19, it is clear that the share of imported basic flat glass in the total consumption in the United States has decreased for the past six years, but the share of imported flat glass (basic flat glass plus processed glass) in total consumption has increased during the same period. This fact reveals that the high value-added glass market in the United States is under fierce

competition from imports. Foreign manufacturers are trying to penetrate into the high value-added products market in the United States. Table 4-9 shows changes in total imports of various glass products.

Table 4-9

Flat glass imports by the imports statistics group in the U.S.

value : million dollars

TSUSA No. 1/	541**** 542****	% change	543****	% change	544****	% change
1980	29.362		19.774		108.020	
1981	26.672	-9.2%	22.783	15.2%	104.911	-2.9%
1982	22.848	-14.3%	23.612	3.6%	150.398	43.4%
1983	27.150	18.8%	30.627	29.7%	203.392	35.2%
1984	26.648	-1.8%	30.072	-1.8%	281.226	38.3%
1985	27.237	2.2%	40.381	34.3%	349.579	24.3%

1/ TSUSA No. 541**** and 542**** represent basic flat glass except for wire glass. 543**** represents wire glass, and 544**** represents processed glass such as toughened and laminated glass.

Source : [24]

d) The U.S. manufacturers' response

Because some especially high technologies are required for high value-added processed glass, the United States glass industry still has some lead in the global competition. However, there are some strong competitors in the world such as Japan; therefore, the U.S. glass industry is trying to do two things at the same time. First, it is trying to protect

its own market by using a surtax to prevent low-priced imports. U.S. Industrial Outlook [22] reports that in December 1982 the countervailing duty became effective on imports of float glass from the Federal Republic of Germany and the United Kingdom and continued to June 17, 1985.

Second, the U.S. glass industry is trying to become a global industry that can compete in its own domestic market as well as the foreign market. The U.S. glass industry is using several strategies to maximize profits : increasing efficiency of production through such measures as joint ventures; selling patents; and transplanting production to countries where production is less expensive than in the U.S. For example, Libbey-Owens-Ford Company in 1986 agreed to jointly build an automobile windshield manufacturing plant in the United States with Nippon Sheet Glass Company of Japan. Another strategy was that of PPG Industries, Inc., which in 1985 granted a license to produce sheet glass using the company's patented process to China National Technical Import Corporation. A final example is that of Guardian Industries, which acquired a majority interest in the largest independent glass producer in Spain [32].

e) Exporters' response

As described before, flat glass exporters to the United States have been shifting their export products from low value-added basic flat glass to high value-added processed glass. Japan has been one of the biggest exporters of these

high value-added glass products in the 1980s, but its share in the total imports to the United States is decreasing gradually even though the value of Japan's exports increased (Figure 4-22).

Instead of trying to focus solely on increasing exports, Japanese glass manufacturers are trying to establish their plants in the United States for two reasons: first, they cannot ignore the trend toward protectionism in the United States; second, they are responding to the requests of Japanese auto-manufacturers who have asked their Japanese material suppliers to establish plants near Japanese auto-manufacturing plants in the U.S. We cited earlier the joint venture by Nippon Sheet Glass Company. Another example is that of the Asahi Glass Company of Japan, which has established two subsidiary firms in Ohio to produce windshields beginning in 1987 [32].

Tables A-15 through A-19 in the appendix show detailed information about flat glass shipment and trade in the U.S.

4-7 Construction Machinery

In 1982, there were 805 construction machinery producers in the United States [15]. There are two types of construction machinery producers in the United States, large multinational, and small and medium size companies. Large multinational companies have a complete line of products, and small and medium-size companies concentrate their production on a specific segment of the industry [34].

In the following discussion of construction machinery, the expression "domestic supply" will be used instead of consumption because of the nature of this product.

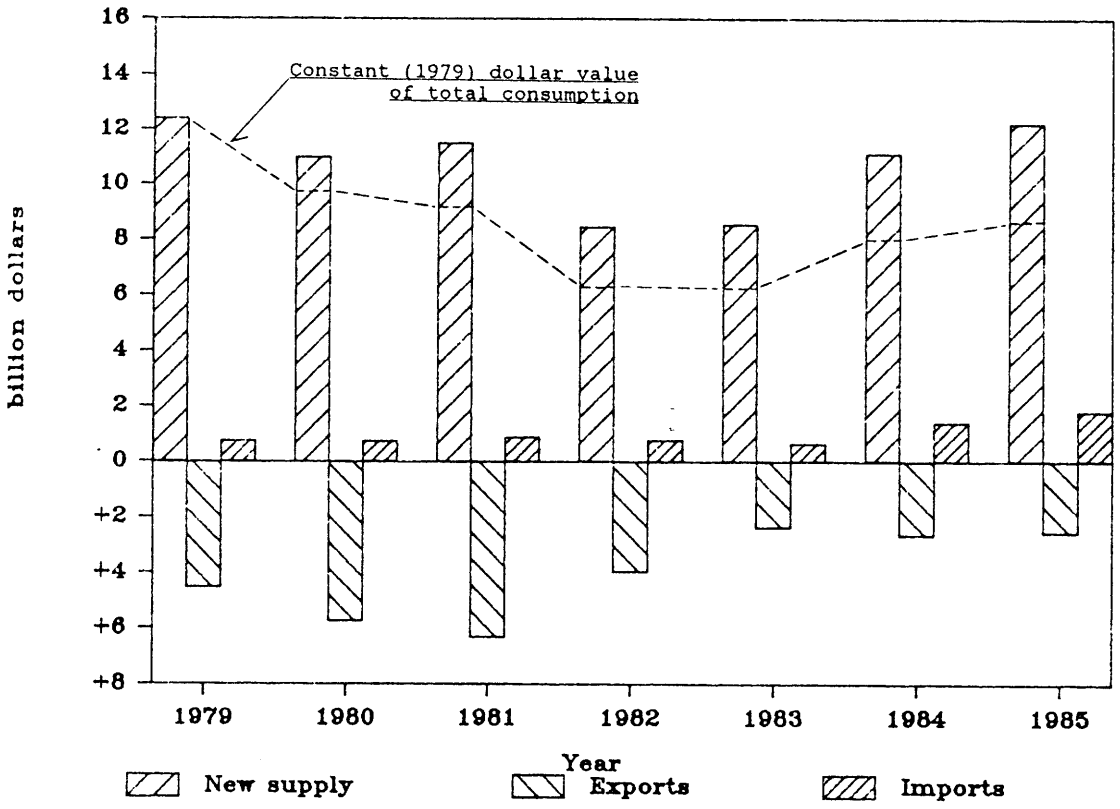
a) Total domestic supply and total imports

Figure 4-23 shows the new total domestic supply and total imports plus exports of American construction machinery. The total supply of construction machinery reflects general economic conditions rather than construction investment. During the recession in 1982 and 1983, contractors tended to avoid investing in costly new equipment. Many contractors were cash-poor and thus leasing and rentals became a popular alternative to making large equipment purchases [ENR Mar.29, 1984].

The main exporters of construction machinery to the United States are Japan, Canada, West Germany, and the United Kingdom. In 1983, these top four foreign supplier countries accounted for almost 75 percent of U.S. imports [34].

Figure 4-23

Construction Machinery in the U.S. :
Total new supply and total imports with exports



Source : [22]

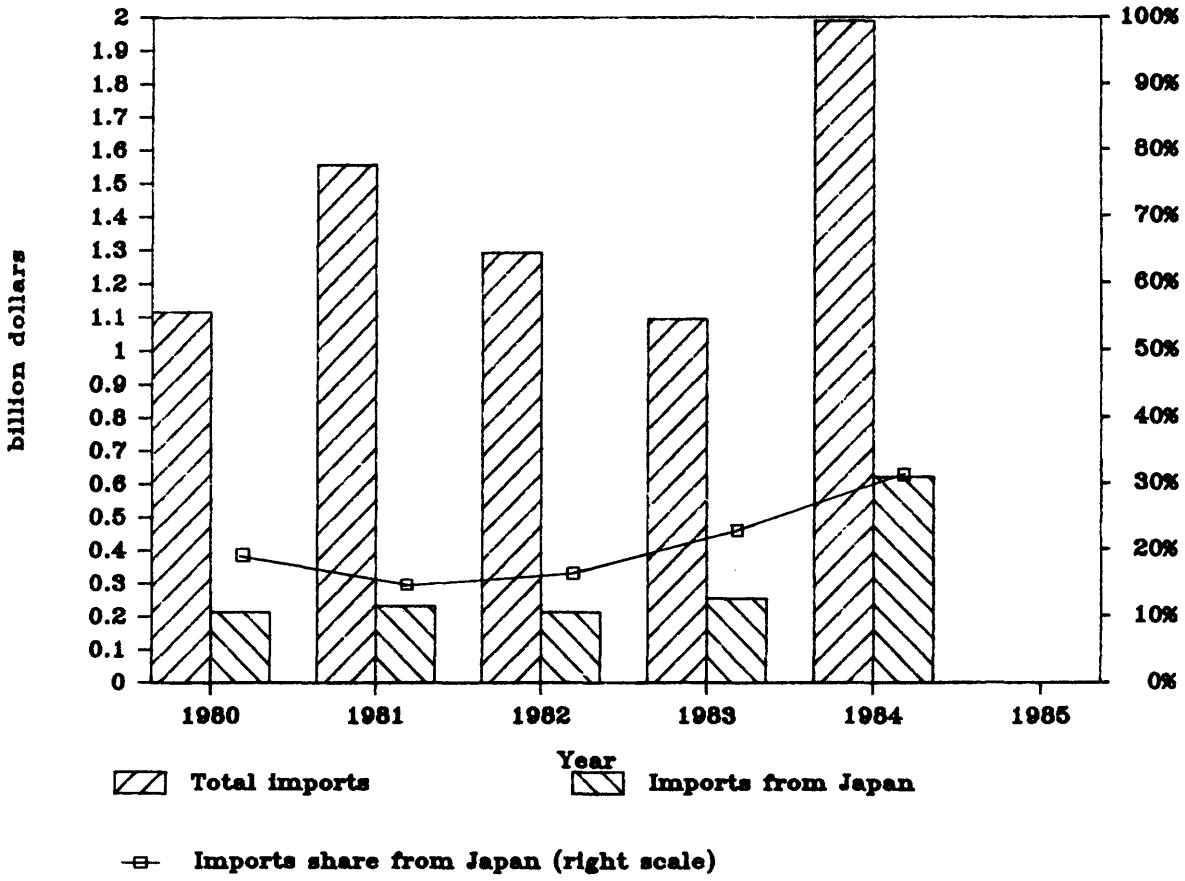
b) Imports from Japan

According to the Department of Commerce, in 1984 the construction machinery imports from Japan amounted to about 30 percent of the total U.S. construction machinery imports. Figure 4-24 shows the total imports of construction machinery in relation to imports from Japan. Total imports of construction machinery decreased in 1982 and 1983 because of the recession. However, they increased rapidly in 1984 and 1985.

In line with this trend, imports from Japan increased too. This figure forecasts future difficulty which the U.S. manufacturers would have to face in the domestic market. In 1986, the U.S. construction machinery industry was able to avoid the most hazardous objection to their sales, the high value of the U.S. dollar [33]. However, the rapid depreciation of the dollar against currencies of developed countries seems to have given small relief to ailing domestic manufacturers.

Figure 4-24

Construction machinery in the U.S. :
Total imports and imports from Japan



Source : [35]

c) Effects of Imports

In the first half of the 1980s, because of the high value of the U.S. dollar, high labor costs, and high material costs, the construction machinery manufacturers in the United States were trying to establish their subsidiaries, affiliates, and licensees abroad. Many recent imports are from subsidiaries, affiliates, and licensees of U.S. firms. Such imports often consist of component parts or attachments, and are imported and incorporated into machines assembled in the United States.

In the construction machinery industry, sufficient stocking of parts and quick repair service by distributors are essential to sales. Therefore, until recently domestic manufacturers made most of the parts for domestic use and thus retained a lead against foreign manufacturers who did not have a good distribution and service network in the United States. Therefore, the decline of domestic manufacturers' shipment is not an indication of weakened competitiveness nor is it due to fierce competition with imported machinery, but reflects a declining world market demand for construction machinery.

d) The U.S. manufacturers' response

The exports of the construction machinery accounted for 40 percent of U.S. sales in 1981. In 1982 the decrease in exports due to the world-wide recession forced the U.S. manufacturers to make the tough decision to reduce or

liquidate their businesses. Some manufacturers remained competitive by investing in new plants and some increased foreign manufacturing by eliminating less productive domestic plants.

However, this recent development is not due to an increase in imports. Instead, partly because of this trend, total imports have increased in the United States. Ironically, this ended in the flood of imported construction machinery in 1986. ENR reported that imports increased 15 percent over 1985, and thus captured more than 40 percent of the U.S. construction machinery market
[ENR Dec.18, 1986 p63].

e) Exporters' response

As in the case of some other construction materials, there is world-wide over-capacity for construction machinery production. All the big foreign manufacturers consider the U.S. to be the most lucrative market and are trying to penetrate it. However, as mentioned before, a good distribution and service system is essential in the construction machinery industry. In order to provide good service, the manufacturer has to establish a good back-up system for the distributors. Therefore, direct investment in a plant in the U.S. by the foreign manufacturer is the first step for penetration into the U.S. market.

ENR reported some cases of foreign construction machinery manufacturers who are trying to establish their subsidiaries in the United States.

> Komatsu Ltd., Tokyo, plans to pump $18 million over the next three years into its newly acquired Chattanooga, Tenn., plant. The newly established Komatsu American Manufacturing Corp. signed a $3.5 million contract last month to buy a 320,000 sf plant from Koehring Co., a subsidiary of AMCA International Ltd [ENR Mar.28, 1985].

> Sumitomo Heavy Industries Inc., a Japanese construction and heavy equipment maker, has acquired a 49% interest in the construction equipment lines of FMC Corp. Under the transaction, the terms of which were not disclosed, a new joint-venture company will be formed Link-Belt Construction Equipment Co. FMC will retain 51% of the new Lexington, Ky., company through 1988, after which it will become a "minority owner." An FMC spokeswoman says the company eventually will phase out its involvement in construction equipment. Sumitomo has been a licensee of FMC's Link-Belt equipment in Asia for 23 years. Its chairman, T. Nishimura, says the purchase supports the company's "long-term strategy to become a leading worldwide supplier of construction equipment."
> [ENR Jul.24,1986]

Tables A-20, A-21 in the appendix show detailed information on construction machinery shipment and trade in the U.S.

4-8 Summary of the U.S. construction material market

It is possible to categorize the U.S. construction materials market into three types from the point of view of Japanese exports:

(1) the negative market : in which the foreign construction materials, including the Japanese, are sold at the expense of the U.S. manufacturers ;

(2) the positive market : in which the U.S. manufacturers are transforming or have already transformed their industries' structures in order to integrate domestic production with imported materials including the Japanese-made ones ;

(3) the neutral market : in which Japanese exports are competing with exports of other countries rather than with the U.S. products.

The cement industry reflects a combination of the negative and the positive market factors. The sale and production of cement require a certain amount of investment and a good distribution system. Therefore, the domestic cement producer who has already established a good distribution system has a strong advantage against foreign exporters to the U.S. Domestic cement producers actually suffer from low-priced cement imports, but they can control imported cement with their advantage in distribution. They are transforming their industry structure from one that only produces cement to one that both produces and imports cement.

The steel industry is functioning in a negative market.

Because the sale of structural steel and concrete reinforcing bars is taking place individually and does not need established distribution systems by domestic producers, the domestic steel manufacturers cannot control the imported steel. They have to compete with the imported steel products or go out of business. Therefore, the only way for the domestic steel mill manufacturers to control imports is to protect their market with certain regulations such as quotas and surtaxes. Japan has played the largest role in causing the problems facing the U.S. steel industry. However, the dramatic appreciation of the Japanese yen will diminish Japan's role in the near future.

The lumber industry is operating in a negative market because of Canadian exports. Japan does not have any effect on this market. This situation will not change for a long time.

The plywood industry reflects a combination of the positive and the neutral market factors. In the soft plywood market the domestic producers are supplying more than 99 percent of domestic consumption. Therefore, it can be said that there is no competition between domestic and imported soft plywood. In contrast to soft plywood, hard plywood imports amount to more than half of domestic consumption. This is partly because the domestic plywood manufacturers have not concentrated on hard plywood production and partly because the low-priced hard plywood is being imported from South East Asia. The Japanese hard plywood manufacturers are

competing with other exporters rather than with the U.S. manufacturers in the U.S. market.

The tile industry is competing in a neutral market situation relative to foreign manufacturers. The U.S. tile industry has avoided competition with imported tile for a long time. Because the U.S. tile manufacturing industry began at a time when there were mature tile manufacturing industries in other countries, it had to integrate its products with foreign-made tile right from the beginning. Therefore, the Japanese tile has competed with other imported tile rather than with the U.S. tile alone.

It is very difficult to judge which market the glass industry and construction machinery industry are in now, because both industries are suffering in competition with imported products, they are also trying to become global industries. They are forming joint ventures with foreign manufacturers in the domestic market and transferring new technology to developing countries. Partly because of this strategy, the U.S. imports increased rapidly. The condition of the world economy rather than that of the U.S. economy has had a great effect on both industries in the U.S. It is meaningless to discuss these two industries in the context of the U.S. economy alone. Japan is the strongest competitor in the world market for these products, and the appreciation of the Japanese currency is expected to decrease Japan's competitiveness, though this result has not yet materialized.

Chapter 5 Japan's Construction Material Market

This chapter will examine Japan's counterpart to the U.S. construction materials market and Japan's exports of construction material to the U.S. Construction material shipment has been less influenced by domestic construction investment in Japan than has been the U.S. because of Japan's export-oriented economic structure. Each product will be analyzed according to the following factors:

a) Total shipment and consumption

b) Total exports and exports to the U.S.

c) Total imports and imports from the U.S.

This chapter utilizes available figures and numbers but includes little explanatory information because less data are available for the Japanese than for the U.S. market. These numbers and figures will be most useful to the researcher who wants to examine Japan's construction material market in the future.

Note 1 : 1980 Constant yen figures are calculated according to producer price indexes (Table B-3 in the appendix).

Note 2 : Dollar figures in each graph are calculated according to average exchange rate between 1980 and 1985 (Table B-1 in the appendix).

5-1 Cement

a) Total shipment and consumption

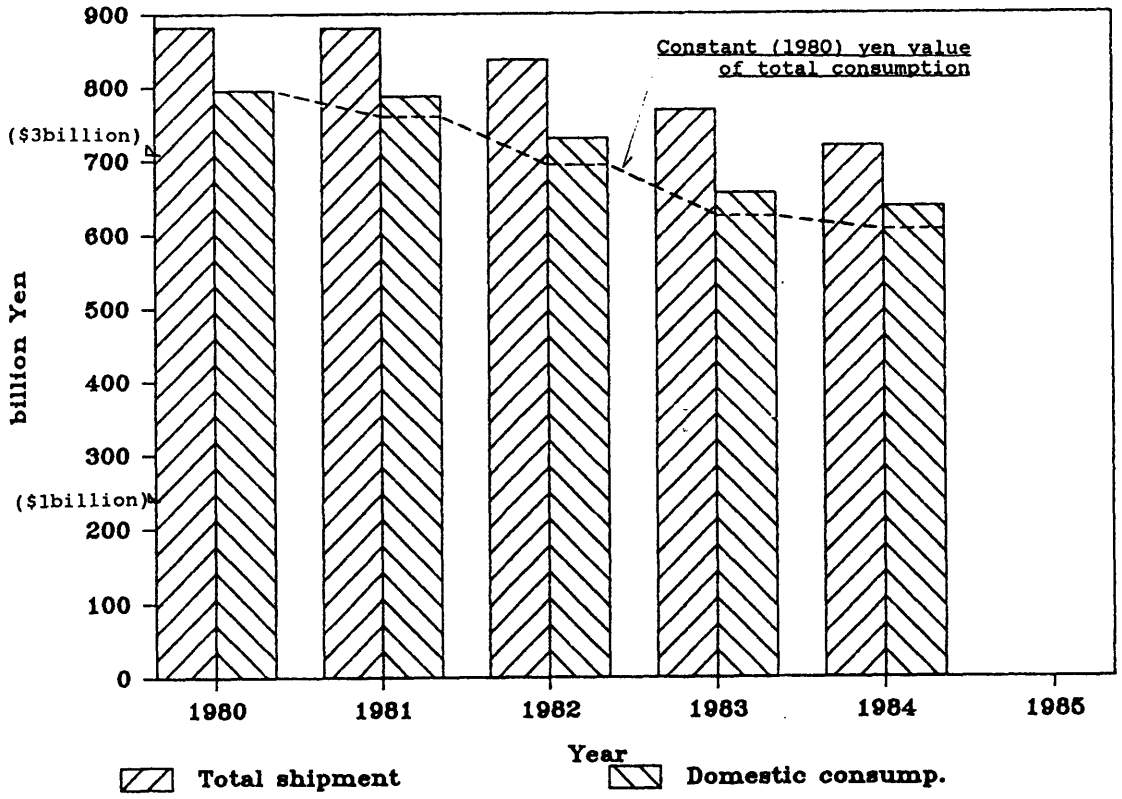
There were 51 establishments producing portland cement in Japan in 1980, and this number decreased to 46 in 1984 [35]. Figure 5-1 shows total shipment and consumption of portland cement in Japan. According to Kougyou Toukei Hiyou (Census of manufactures) [36], cement shipment declined from 80.224 millon ton 6/ in 1980 to 68.204 million ton in 1984, following the decrease in total construction investment (Table A-22). In addition, the price of portland cement dropped from 10,998 yen per ton ($48.5 per ton) in 1980 to 10,525 yen per ton ($44.3 per ton) in 1984. These figures suggest the shrunken sales volume and severe price competition that Japan's cement manufacturers are facing. Responding to this trend, in 1984 the Japanese government allowed the cement industry to form an anti-recession cartel which dictated cement distributors could not cut the price of cement below a certain limit.

In Japan, the cement shipment for domestic consumption, not the total residential construction investment, is considered to be the barometer of construction activity.

6/ Metric measures will be used throughout this chapter.

Figure 5-1

Cement in Japan : Total shipment and consumption



Source : [36, 37]

b) Total exports and exports to the U.S.

Figure 5-2 shows the total exports and exports to the U.S. of portland cement. The figure shows the rapid decrease in the total exports and the rapid increase in exports to the United States in 1984 and 1985. The main reason for the shrinkage in total exports is that construction activity in developing countries in the Middle East, to which Japan used to export a large amount of cement, has decreased in recent

years due to lower oil production revenues.

c) Total imports and imports from the U.S.

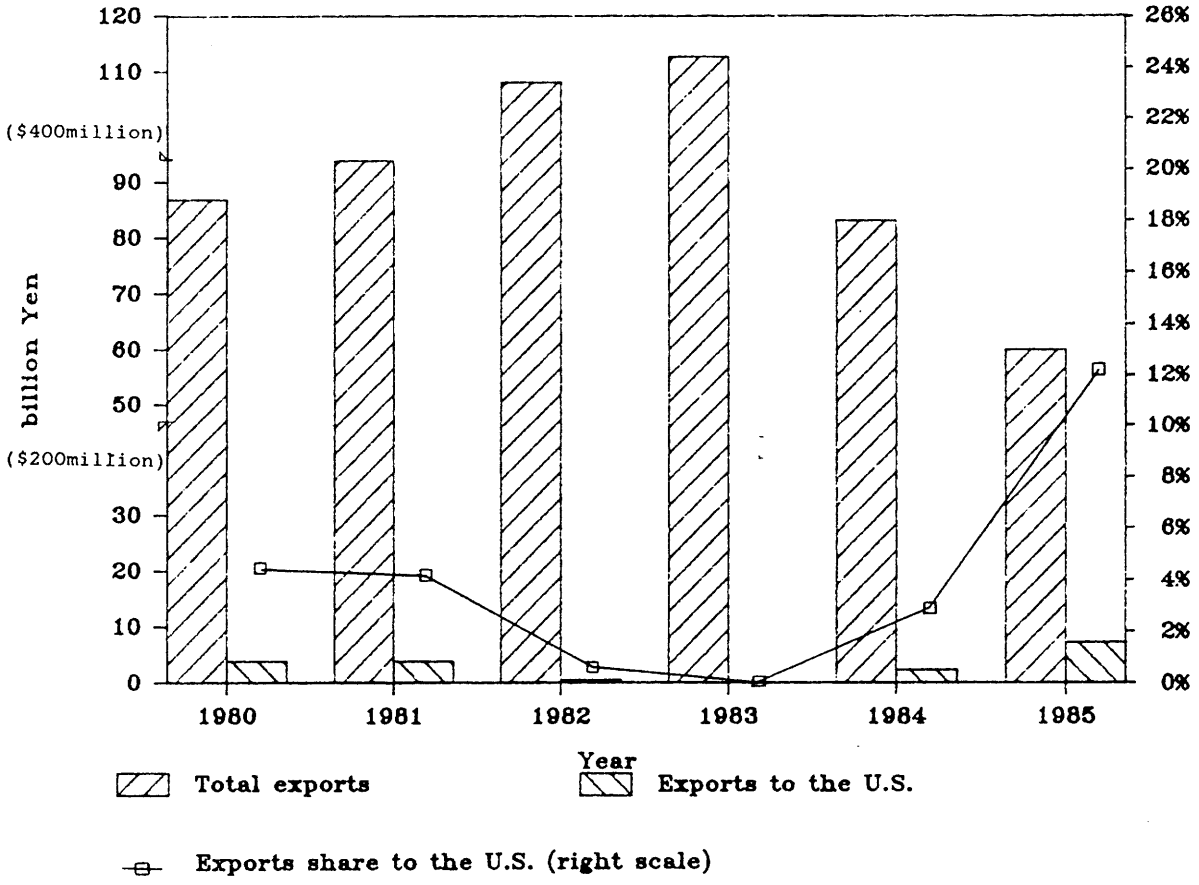
Total imports of portland cement and its imports from the United States are presented in Figure 5-3. Portland cement imports to Japan were less than one percent until 1984 (Table A-22 in the appendix). However, the growth rate of portland cement imports to Japan in recent years indicates a dramatic change in the Japanese cement supply structure. For example, the total portland cement imports were only 14 million yen ($63,481) in 1981, and increased to 4,374 million yen ($18.3 million) in 1985. The number in 1985 was more than 300 times as large as it was in 1981.

In September 1984, the Japanese government approved an anti-recession cartel for the cement industry. The cartel dictated that cement distributors could not cut the price of cement below a certain limit. This cartel was planned to protect the cement industry from domestic recession; however, it may unintentionally reverse the trend toward increasing imports of low price cement. Because Japan imports a very small volume of portland cement, it does not seem to be a very important trade issue to other cement producing countries right now.

For detailed information about cement shipment and trade, see Table A-22 in the appendix.

Figure 5-2

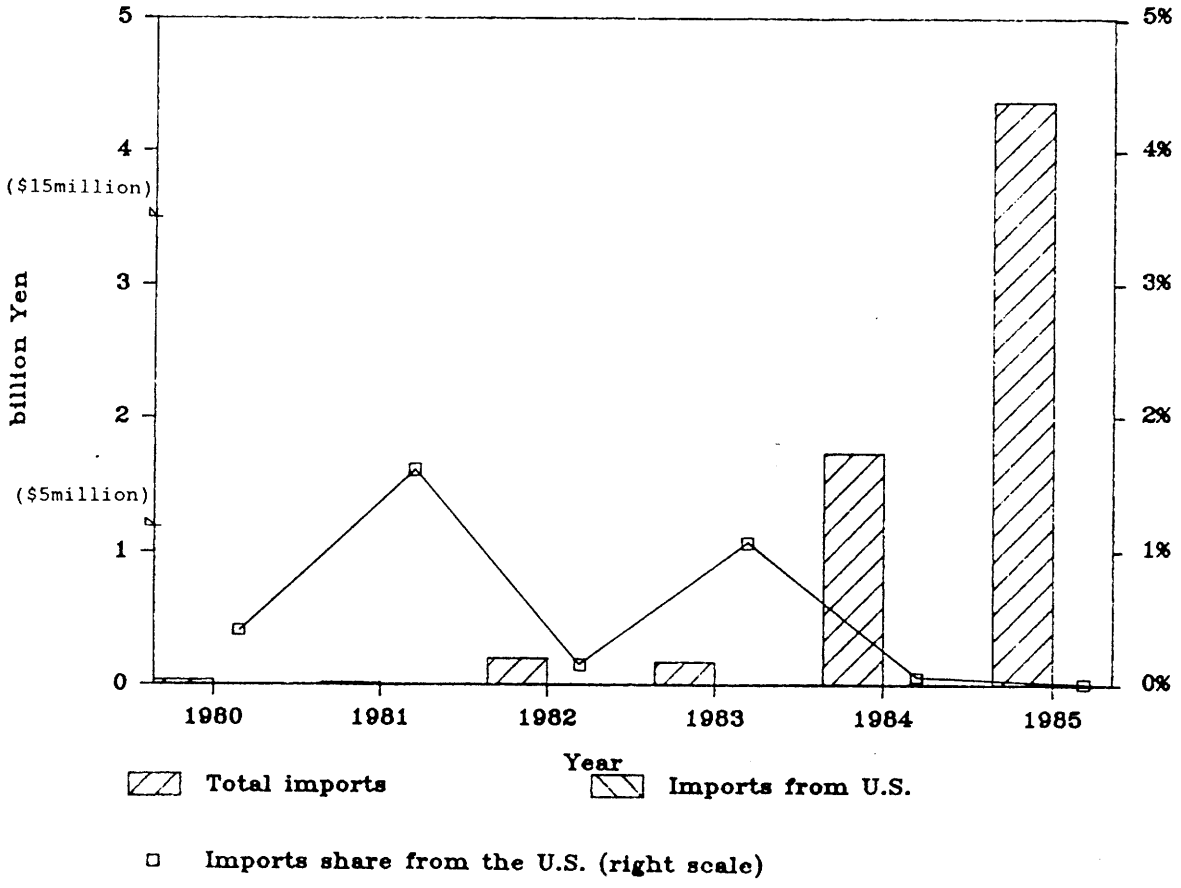
Cement in Japan : Total exports and exports to the U.S.



Source : [37]

Figure 5-3

Cement in Japan : Total imports and imports from the U.S.



Source : [37]

5-2 Steel

In this section, the total shipment of steel mill products and their shipment for construction will be explained in section 5-2-1. The domestic structural steel market and international trade will be examined in detail in section 5-2-2.

5-2-1 General steel mill products

Table 5-1

Steel mill products : Total shipment and shipment for construction industry in Japan
thousand tons

Year	Total	Construction	%
1979	87,161		
1980	86,734	5,644	6.5%
1981	78,474	5,218	6.6%
1982	75,986	4,775	6.3%
1983	75,955	4,370	5.8%
1984	80,711	4,668	5.8%

Source : [12]

As shown in Table 5-1, the total shipment of steel mill products decreased until 1983 due to the world-wide recession and rebounded a little in 1984. Steel shipment for the construction industry has fluctuated according to construction investment in Japan. The table also shows that the share of steel consumption in the construction industry has been below seven percent and has been decreasing gradually.

Table 5-2 shows detailed information about steel shipment for the construction industry.

Table 5-2

Total steel shipment and steel shipment for the construction industry of structural steel and bars in Japan

thousand tons

	Structural steel			Bars		
	Total	Con-struction	%	Total	Con-struction	%
1979	11,246			15,164		
1980	11,371	988	8.7%	14,380	3,089	21.5%
1981	11,155	914	8.2%	12,448	2,682	21.5%
1982	10,855	838	7.7%	13,208	2,362	17.9%
1983	10,352	718	6.9%	13,475	2,315	17.2%
1984	10,729	778	7.3%	13,485	2,477	18.4%

Source : [12]

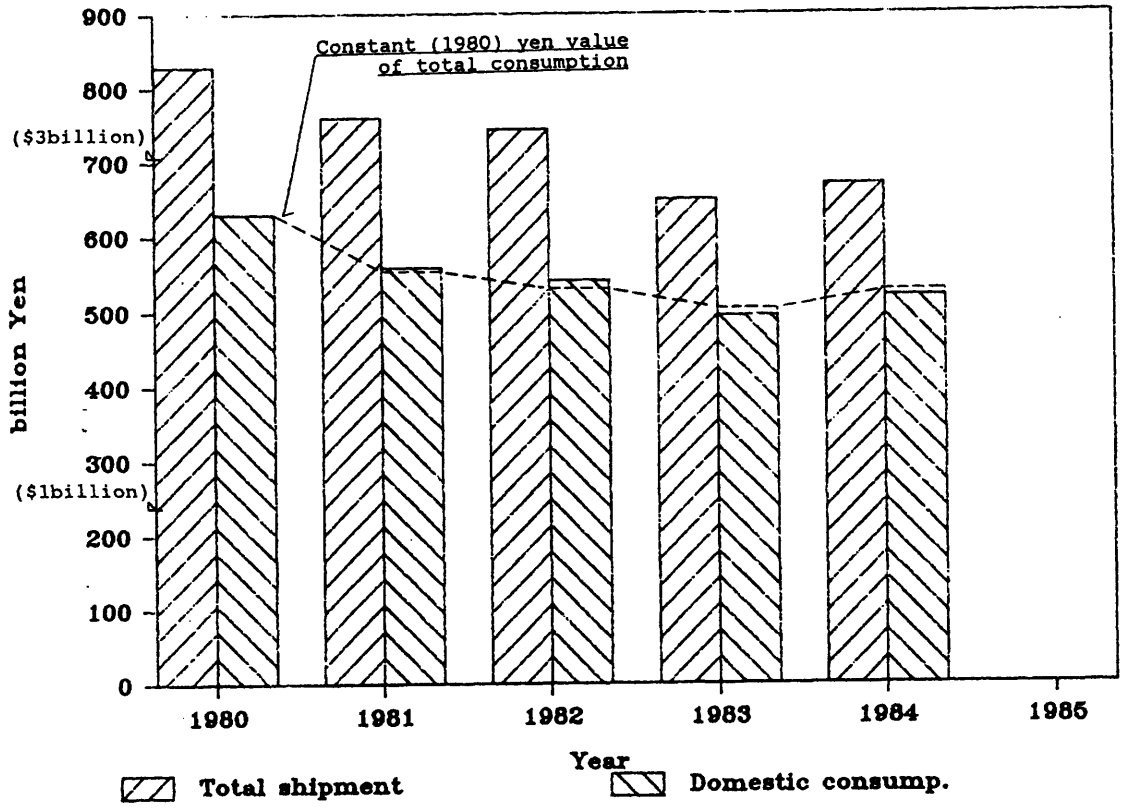
5-2-2 Structural steel

a) Total shipment and consumption

Figure 5-4 shows the total shipment and consumption of structural steel in Japan, according to Kougyou Toukei Hiyou (Census of manufactures) [36] and Yushutu-niyuu Geppiyou (Monthly Report of Trade) [37].

Figure 5-4

Structural steel in Japan :
Total shipment and total consumption



Source : [36, 37]

As discussed in 5-2-1, structural steel consumption in the construction industry has been less than nine percent of total structural steel consumption in the 1980s. The situation contrasts with the U.S. counterpart where 52 percent of structural steel is reportedly being consumed in construction. (This may be due partly to Japan's export-oriented economy structure and partly to the difference of statistical methods in both countries.) Therefore, the total

consumption of structural steel does not necessarily reflect construction investment in Japan.

b) Total exports and exports to the U.S.

Figure 5-5 shows the total exports of structural steel and its exports to the United States. Total structural steel exports decreased partly because of the world-wide recession and partly because of the fierce competition with newly industrialized countries (NICs) in the world market.

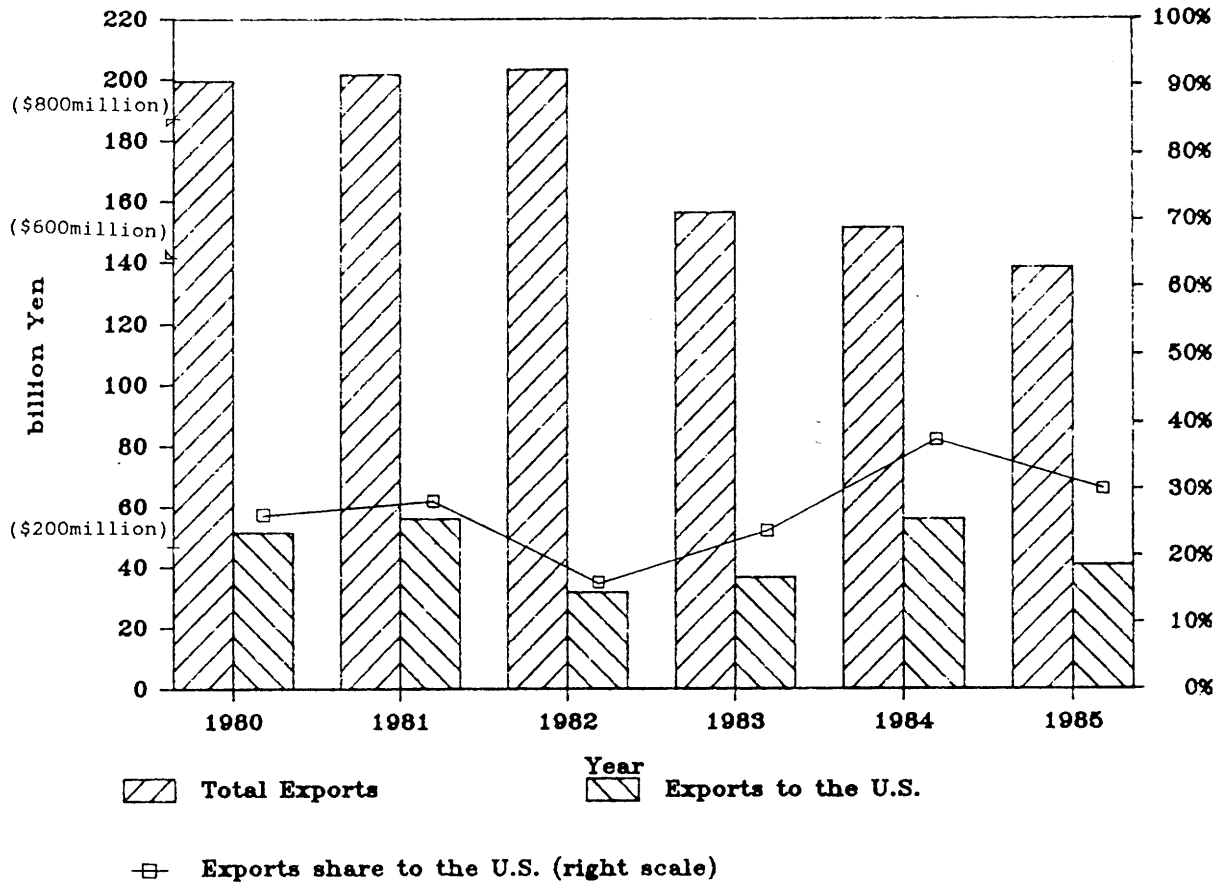
c) Total imports and imports from the U.S.

Figure 5-6 shows the total imports of structural steel and its imports from the United States. It indicates the future increase of Japan's total imports of structural steel and decrease of the share of imports from the United States. ENR reports that Japanese companies are importing more structural steel from South Korea because the stronger yen makes it cheaper [ENR Dec.19, 1985].

For detailed information about structural steel shipment and trade, see Table A-23 in the appendix.

Figure 5-5

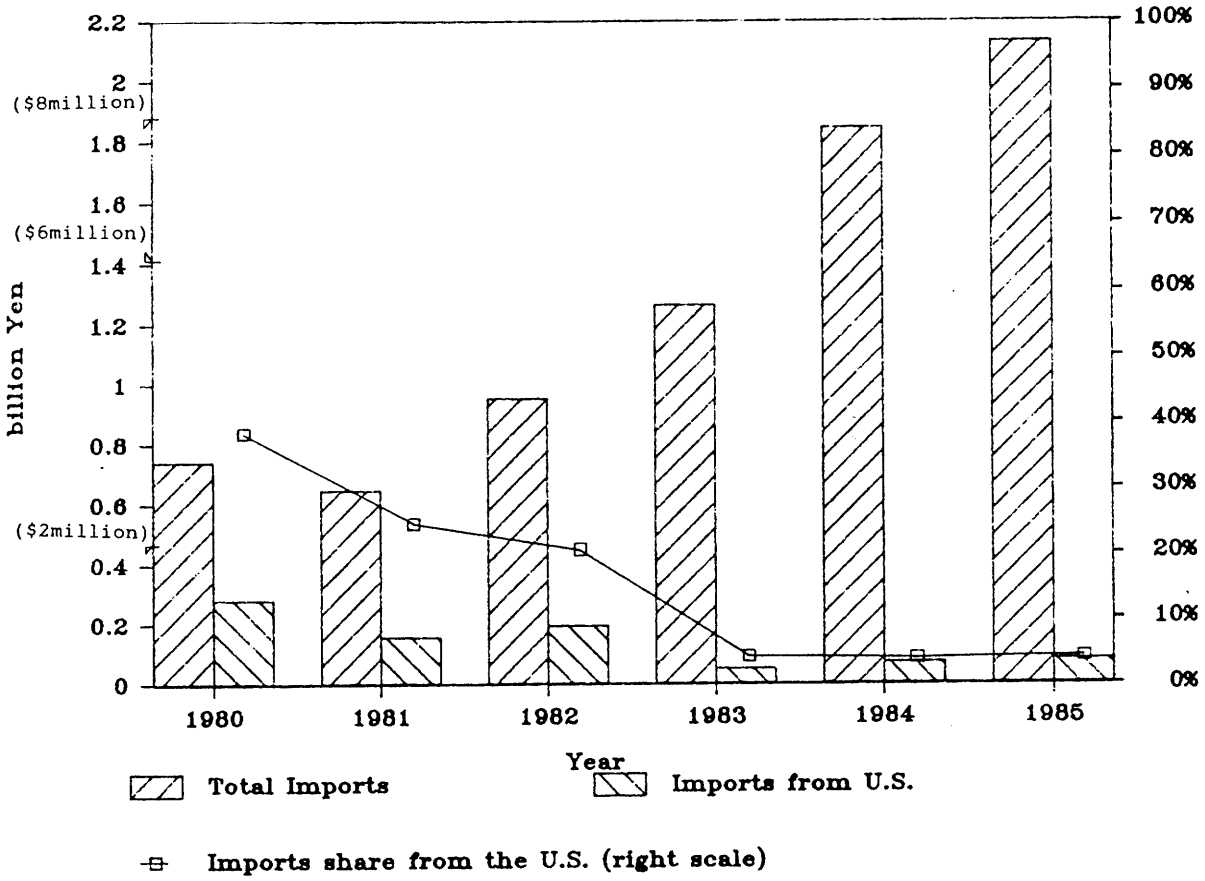
Structural steel in Japan :
Total exports and exports to the U.S.



Source : [37]

Figure 5-6

Structural steel : Total imports and imports from the U.S.



Source : [37]

5-3 Lumber

a) Total shipment and consumption of timber for lumber production

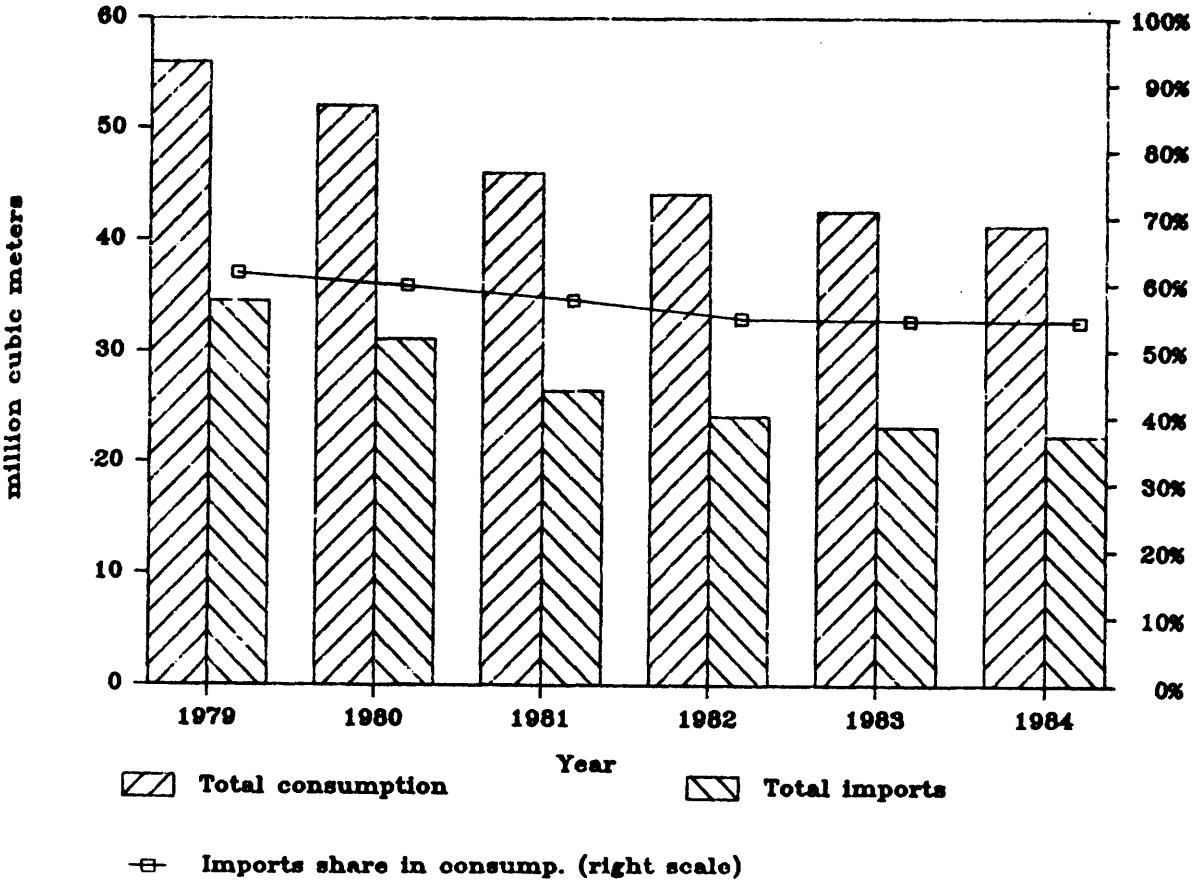
Figure 5-7 shows the volume of total consumption of timber for lumber production and its imports to Japan. The consumption of timber for lumber has decreased from 56 million cubic meters in 1979 to 41 million cubic meters in 1984 (Table 5-3). Two main reasons account for this decreased trend: (1) the decrease of residential construction investment which is the major customer for lumber products; and (2) the decreased share of wood structured houses in Japan brought about by the industrialization of the single-family-housing industry. It is reported that the share of wood-structured residential houses in 1984 became less than 50 percent [38]. Until the 1950s, a single family house meant a wood-structured house in Japan.

Japanese timber producers have both optimistic and pessimistic expectations about their domestic timber supply. One simple and optimistic calculation indicates that the Japanese domestic timber supply will become sufficient for total domestic consumption without any imports in 30 years. This calculation shows that the total domestic wood supply will be more than 80 million cubic meters (for all timber use) by the year 2015 and sufficient for the demand which is forecast not significantly to exceed present demand (1985): 65 million cubic meters [38]. The pessimistic view, predicts

that high domestic transportation costs will keep the imports as high as they are now even in the next century. It was reported that the cost of transporting domestic timber from deep mountain areas to the lumber mill was 14,000 yen ($58.7) per cubic meter. In contrast the transportation cost of imports from North America or Chile was 7,000 yen ($29.4) per cubic meter [39].

Figure 5-7

Timber for lumber in Japan :
Total consumption and total imports in volume



Source : [12]

Table 5-3

Timber consumption in Japan by timber producing area
thousand cubic meters

Area	1979	1980	1981	1982	1983	1984
Domestic timber	21,461	20,953	19,527	19,953	19,392	18,946
Imports timber total	34,551	31,121	26,418	24,117	23,134	22,272
Lauan 1/	6,813	5,547	4,621	3,798	2,929	2,273
North A.	16,824	15,870	13,438	12,337	12,256	12,203
USSR	7,072	5,937	5,408	5,366	5,130	4,906
Others	3,842	3,767	2,951	2,616	2,819	2,890

1/ Lauan is generally from South East Asia.

Source : [12]

Table 5-4 shows detailed information about the different components of Japan's total timber consumption in 1981. About 67 percent of timber, which was 46 million cubic meters, was consumed for lumber production in that year. Table 5-5 shows detailed information about the different components of lumber consumption in Japan.

b) Total exports and exports to the U.S.

As discussed in section 4-3 (chapter 4), Japan is not wealthy in wood resources. Therefore, there is little export of timber from Japan.

Table 5-4

Timber supply for different purposes in Japan in 1981
thousand cubic meters

Uses	Total	(% of all)	Domestic wood	Imported wood	(share)
Lumber	45,945	(66.9%)	19,527	26,418	(57.5%)
Pulp	1,888	(2.7%)	1,769	119	(6.3%)
Plywood	10,964	(16.0%)	451	10,513	(95.9%)
Wood chip	8,541	(12.4%)	8,413	128	(1.5%)
Others	1,353	(2.0%)	1,210	143	(10.6%)
Total	68,691	(100 %)	31,370	37,321	(54.3%)

Source : [40]

Table 5-5

Lumber products and their consuming sectors in Japan
thousand cubic meters

Sector	1979	1980	1981	1982	1983	1984
Building	30,695	28,260	24,921	23,750	22,523	21,704
Heavy cons.	1,293	1,239	1,116	1,057	1,006	973
Container	3,050	3,156	2,959	2,799	2,868	2,980
Furniture	2,785	2,512	2,114	2,048	1,984	1,829
Ship. Car	286	252	196	210	194	208
Others	1,470	1,439	1,251	1,200	1,157	1,103
Total production	39,579	36,858	32,557	31,064	29,732	28,797

Source : [12]

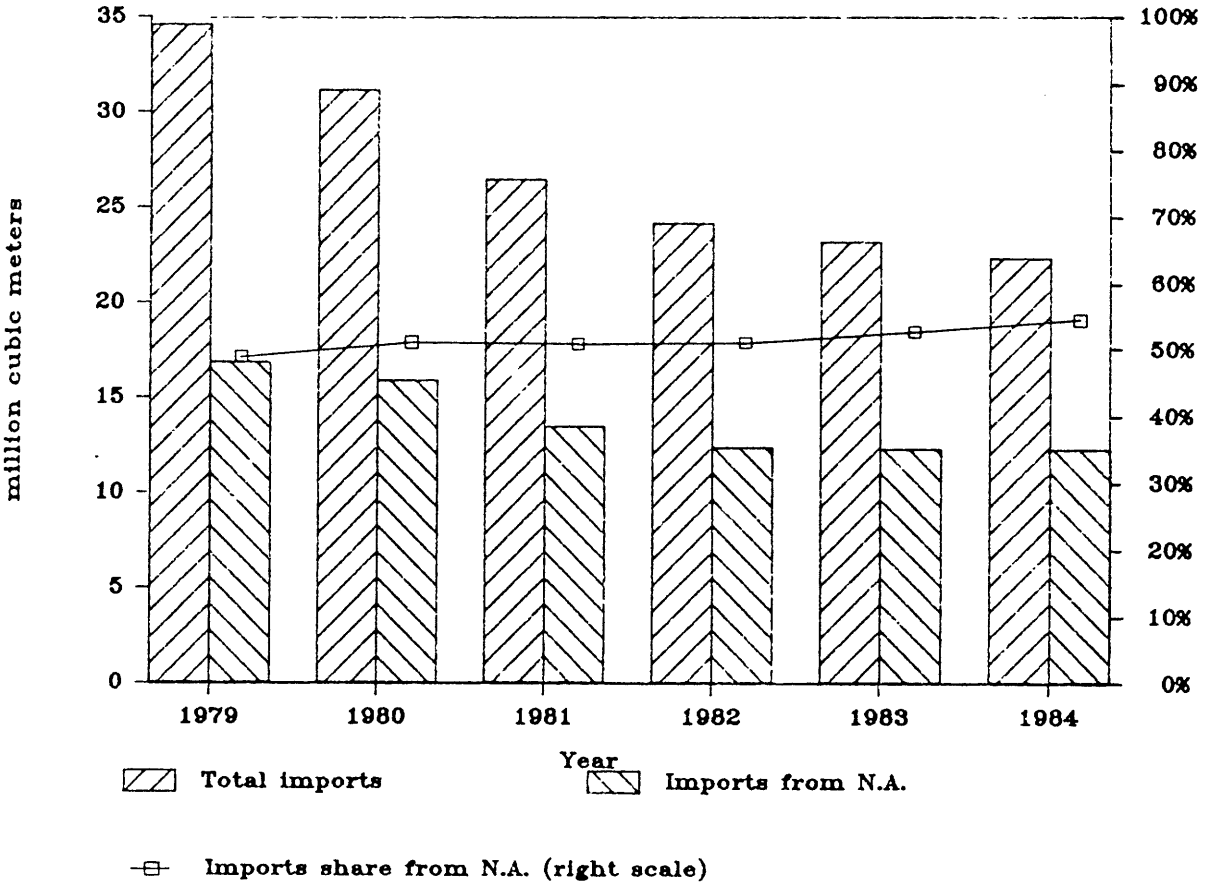
c) Total imports and imports from North America

Figure 5-8 shows total timber imports and imports of lumber from North America. It shows that more than half of the timber imports for lumber comes from North America. (There are no individual figures for U.S. and Canadian timber exports to Japan available.)

Table 5-3 shows detailed information about the area from which the timber is imported, and the volume for lumber production in Japan.

Figure 5-8

Timber for lumber in Japan :
Total imports and imports from North America



Source : [12]

In 1981, according to the U.S. Department of Commerce, Japan's log and lumber imports were 13.4 million cubic meters of softwood log, 14.9 million cubic meters of hardwood log, 3.4 million cubic meters of soft lumber, and 0.4 million cubic meters of hardwood lumber [29]. This means that Japan is importing less-processed wood products for its domestic use as well as for processed products exports. Therefore, the increasing domestic raw wood supply and the policy change of several foreign countries, such as Indonesia's 7/, may affect Japan's wood supply structure in the future.

7/ Indonesia decided to decrease log exports and to increase more-processed products exports such as lumber in 1981.

5-4 Plywood

No individual statistics are available for soft plywood and hard plywood in Japan; total plywood production and consumption will be discussed in this section.

a) Total shipment and consumption

Figure 5-9 shows total shipment and consumption of plywood in Japan. The domestic shipment and consumption have been relatively constant with a small decrease after 1981, following the building construction investment pattern. According to the Japanese government statistics [12], imported timber dominates the raw material supply for plywood production with 96 percent. Table 5-6 shows the historical number of raw material supplied for plywood production.

Table 5-6

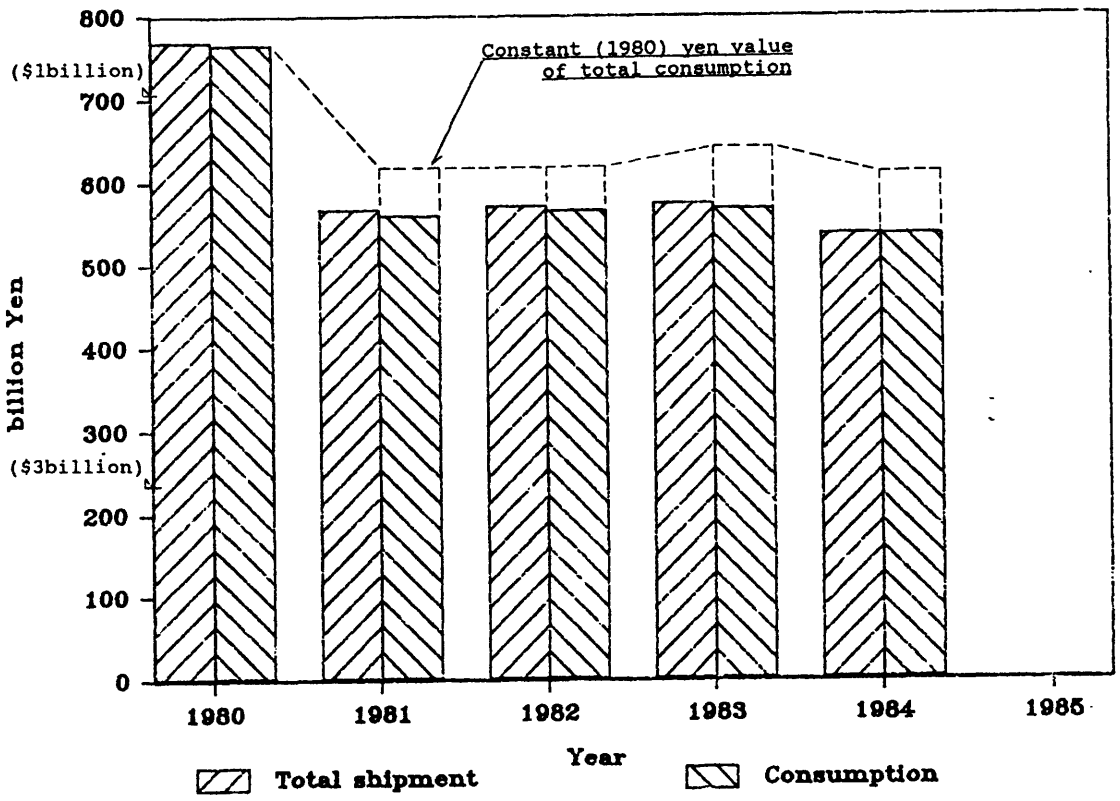
Raw material supply for plywood production in Japan
thousand cubic meters

Year	Total	Domestic		Imports	
1979	13,743	603	(4.4%)	13,140	(95.6%)
1980	12,641	514	(4.1%)	12,127	(95.9%)
1981	10,964	451	(4.1%)	10,513	(95.9%)
1982	10,318	443	(4.3%)	9,875	(95.7%)
1983	10,639	442	(4.2%)	10,197	(95.8%)
1984	10,317	457	(4.4%)	9,860	(95.6%)

Source : [12]

Figure 5-9

Plywood in Japan : Total shipment and consumption



Source : [36, 37]

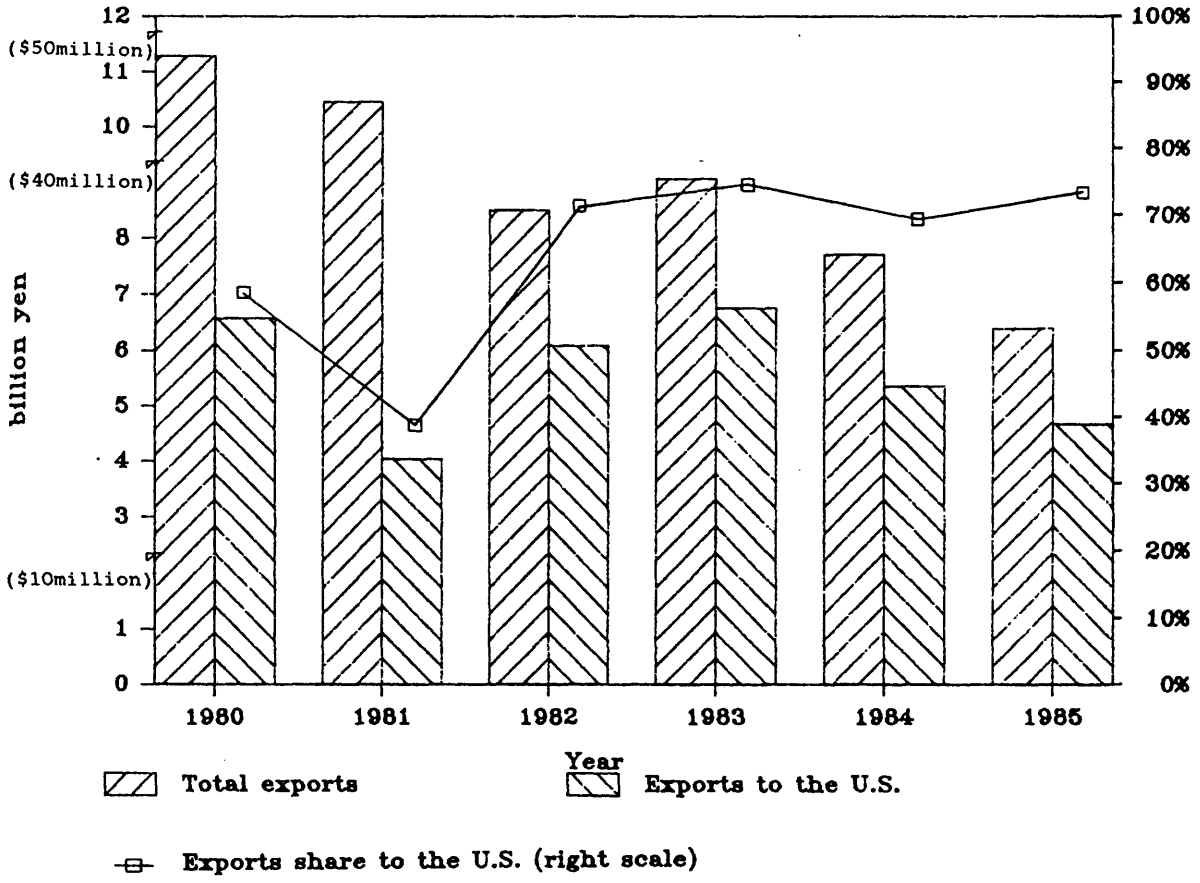
b) Total exports and exports to the U.S.

Figure 5-10 shows total plywood exports and plywood exports to the United States. It shows that there is a decreasing trend in both. There was a sudden plunge in total exports in 1982 and a plunge in exports to the U.S. in 1981. The decreasing trend of exports was due to the Newly Industrialized Countries' (NICs') policy change and their low labor costs for production. It indicates that Japan will no longer

be a competitive exporter of plywood in the world market. This trend should be accelerated by the sudden appreciation of the Japanese yen in 1986.

Figure 5-10

Plywood in Japan : Total exports and exports to the U.S.



Source : [37]

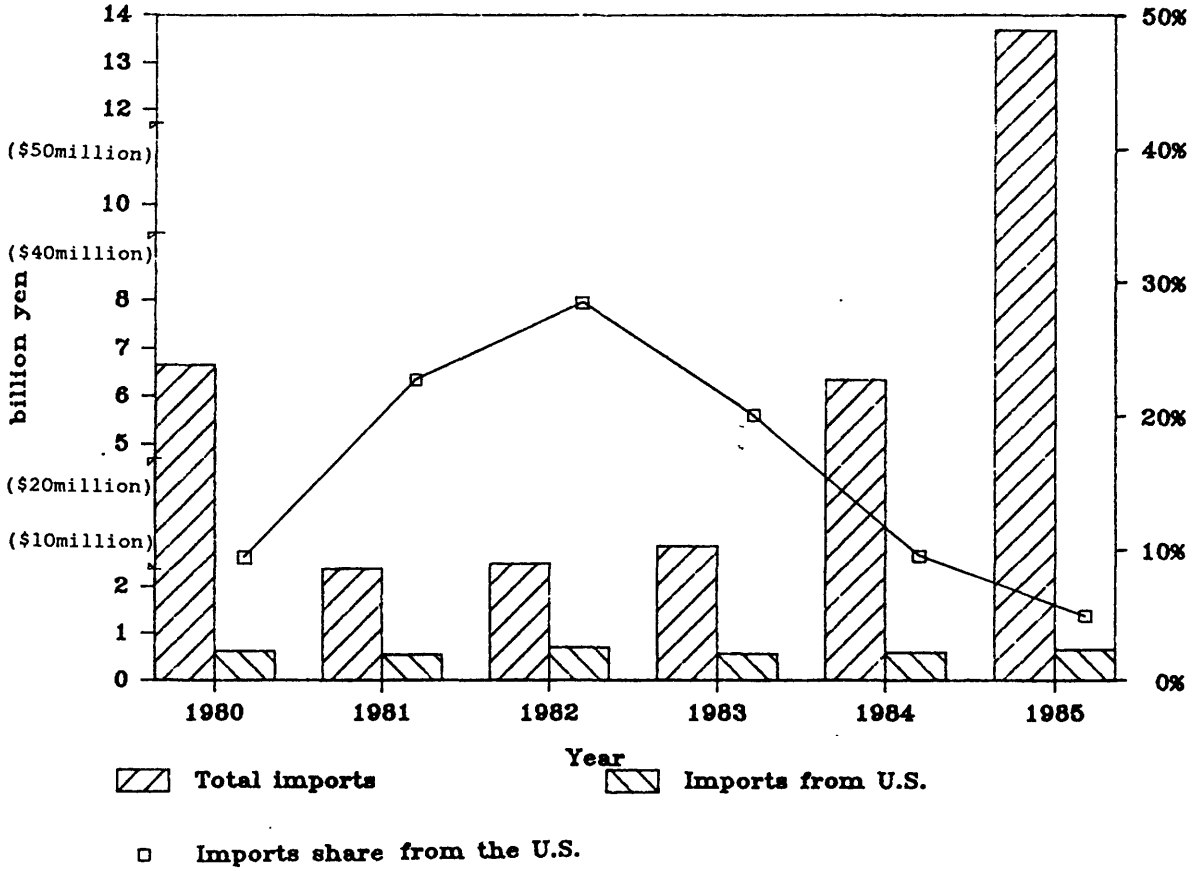
c) Total imports and imports from the U.S.

Figure 5-11 shows total plywood imports and plywood imports from the United States. Japan's plywood imports plunged during the recession (1981 and 1982), but soared after 1984. This indicates that Japan, with its appreciated currency, will become a big importer of plywood in the future. However, Figure 5-11 shows that the U.S.-made plywood imports did not increase at all, while Japanese plywood imports increased rapidly. This is because U.S. plywood is not nearly as competitive in the world market while plywood produced by NICs is competitive.

For detailed information on plywood shipment and trade in Japan, see Table A-24 in the appendix.

Figure 5-11

Plywood in Japan : Total imports and imports from the U.S.



Source : [37]

5-5 Clay (Tile)

a) Total shipment and consumption

Figure 5-12 shows total shipment and consumption of tile in Japan. The domestic consumption of tile has been slightly above 80 percent of all shipments. Tile consumption in Japan is increasing, in clear contrast to the above-mentioned basic construction materials, such as portland cement, structural steel, lumber, and plywood. The decreasing consumption of basic construction materials suggests that the Japanese construction is moving away from the post-war construction situation, in which large numbers of building had to be constructed. The relative increase in the consumption of tile, which is used for interior or for aesthetic exterior purposes, suggests that Japanese construction is entering a new period, in which customers are demanding quality rather than quantity.

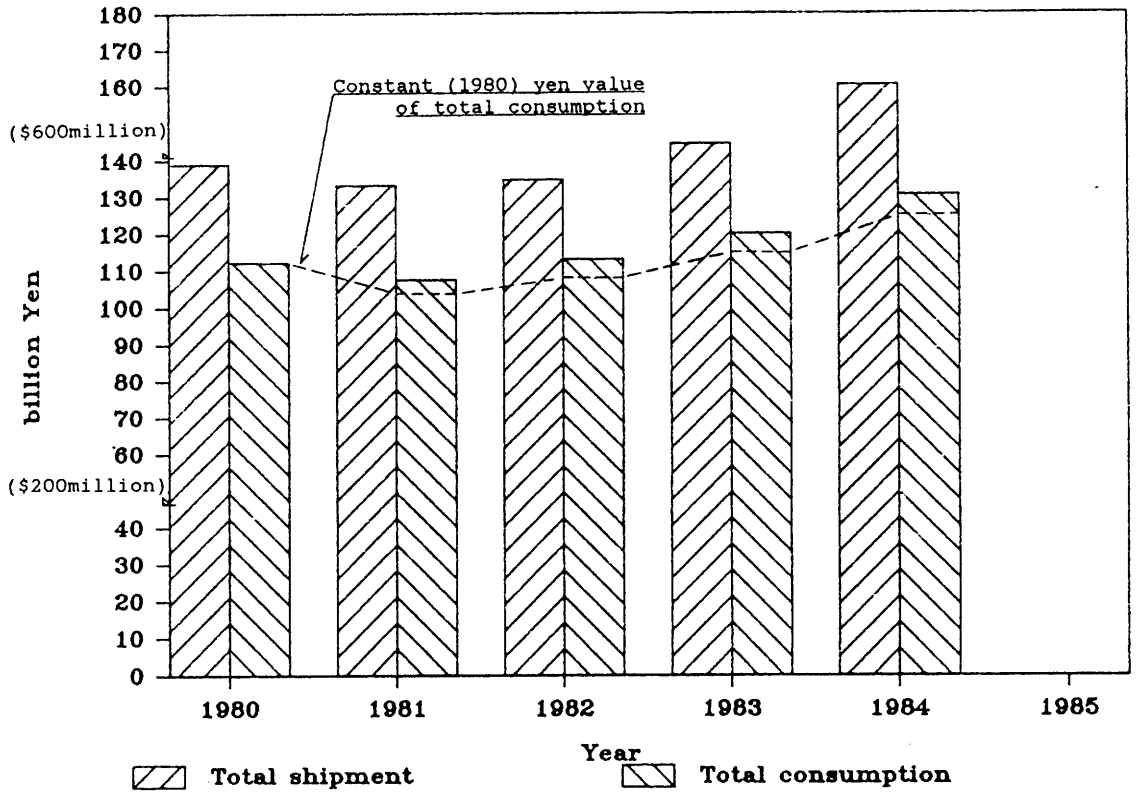
b) Total exports and exports to the U.S.

Figure 5-13 shows total tile exports and tile exports to the United States. Total exports decreased after reaching 203 billion yen ($815 million) in 1982. The decreasing trend as shown in figure 5-13 at the end of 1985 has probably been reversed since the appreciation of the Japanese yen at the end of that year. Tile exports to the U.S. were affected by the recession in the U.S. in 1982 and 1983. Tile exports rebounded in 1984 but decreased in 1985 again. As discussed

in section 4-5 (Chapter 4), several tile exporters are competing fiercely for tile sales in the U.S. market. Most of them share the advantages of low labor cost and a historical background in tile-making. The high value of the Japanese yen will make it very difficult for the Japanese tile-manufacturers to retain their present share in the U.S. market.

Figure 5-12

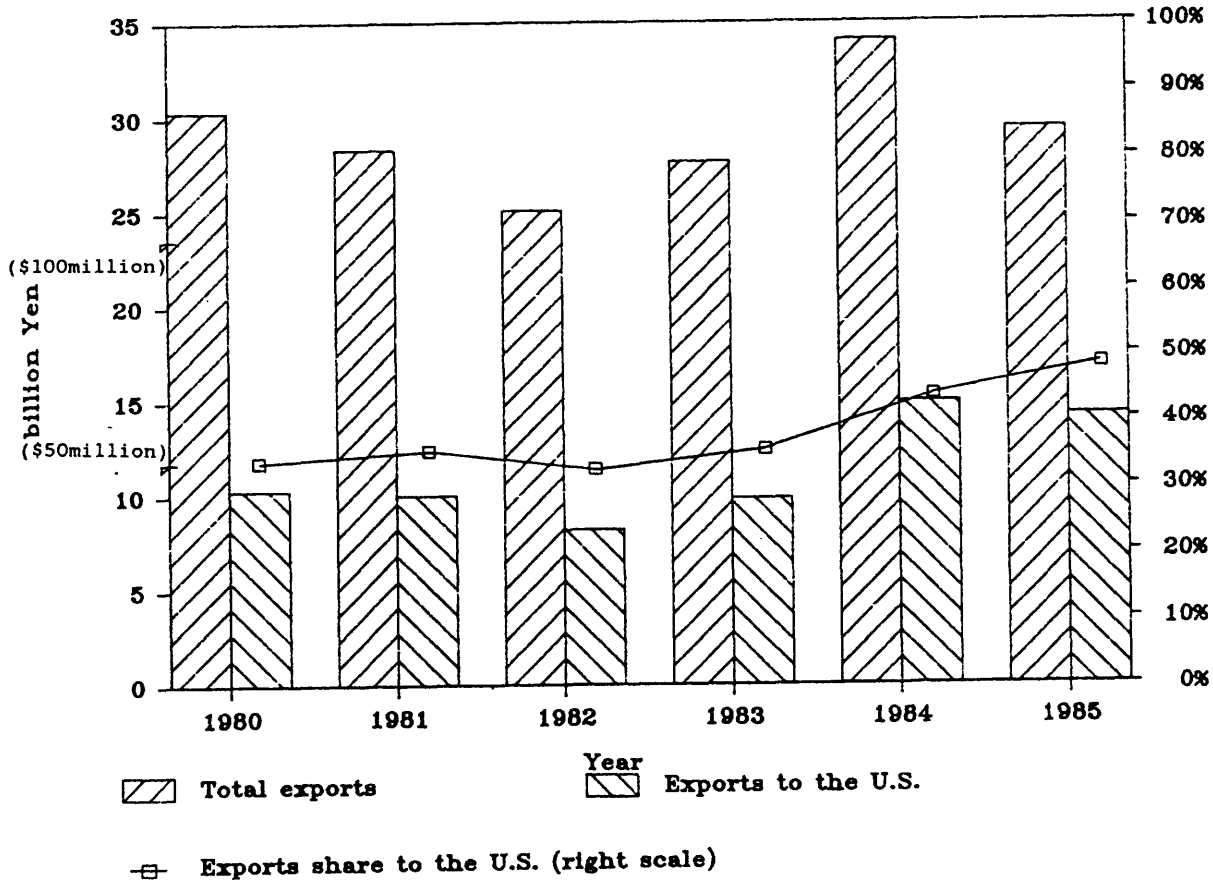
Tile in Japan : Total shipment and consumption



Source : [36, 37]

Figure 5-13

Tile in Japan : Total exports and exports to the U.S.



Source : [37]

c) Total imports and imports from the U.S.

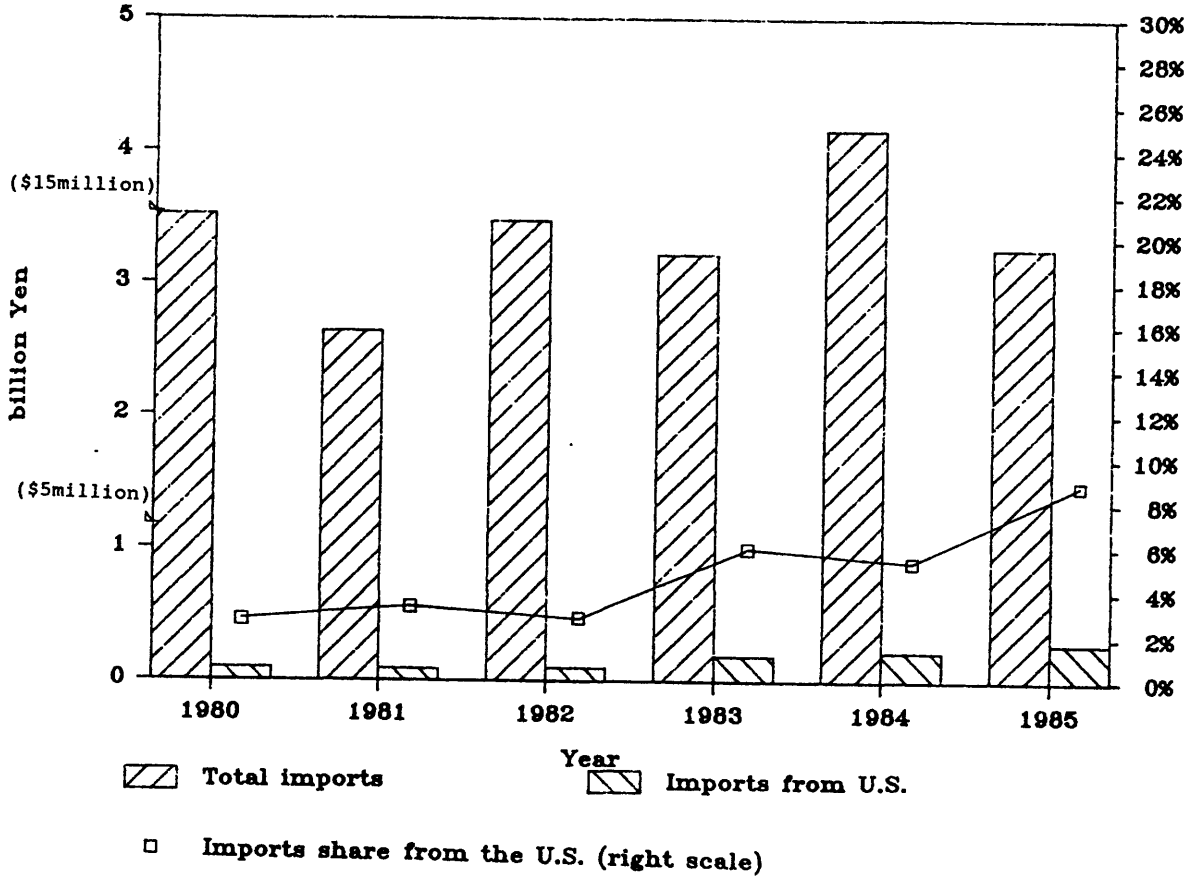
Figure 5-14 shows total tile imports and tile imports from the United States. Total tile imports have been relatively constant for six years despite increases in Japanese domestic consumption. Neither U.S. nor other foreign manufacturers have made much effort to penetrate the Japanese tile market. Japan has a long history of manufacturing tile; therefore, Japanese manufacturers produce almost

every kind of tile domestic clients require. Imported tile is used by only a few clients who want foreign specialty tile.

For detailed information on tile shipment and the tile trade in Japan, see Table A-25 in the appendix.

Figure 5-14

Tile in Japan : Total imports and imports from the U.S.



Source : [36]

5-6 Flat glass

a) Total shipment and total construction

Figure 5-15 shows total shipment and consumption of basic flat glass in Japan. Figure 5-16 shows total shipment and consumption of processed flat glass such as toughened and laminated glass in Japan. Because the biggest consumer of flat glass (both basic flat glass and processed flat glass) is not the construction industry but the auto-manufacturing industry, flat-glass consumption has recorded a healthy increase for the past six years.

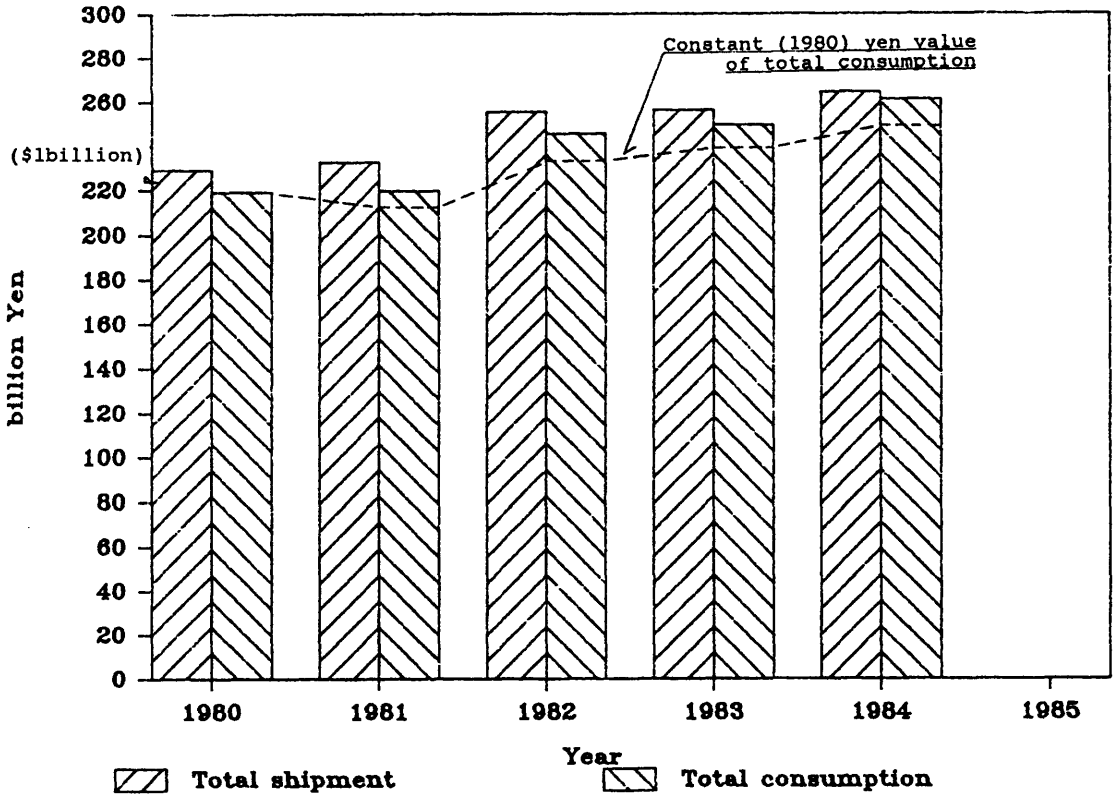
b) Total exports and exports to the U.S.

Figure 5-17 shows total basic flat glass exports and basic flat glass exports to the United States. Total basic flat glass exports decreased after 1981. Figure 5-18 shows total processed flat glass exports and processed flat glass exports to the United States. These figures may suggest that Japanese-made basic flat glass is losing its competitive advantage in the world market where the NICs are trying to expand their sales through low labor costs and the use of advanced technology from the industrialized countries. These figures also indicate that Japanese manufacturers are shifting their production efforts from basic flat glass to the more value-added flat glass. It is interesting to note that basic flat glass exports to the U.S. did not rebound following the recovery of the U.S. flat glass consumption

after the 1982 recession. This is partly because some Japanese glass manufacturers are establishing their plants in the U.S. to avoid the protectionism there and to increase the flat glass supply to the U.S. market.

Figure 5-15

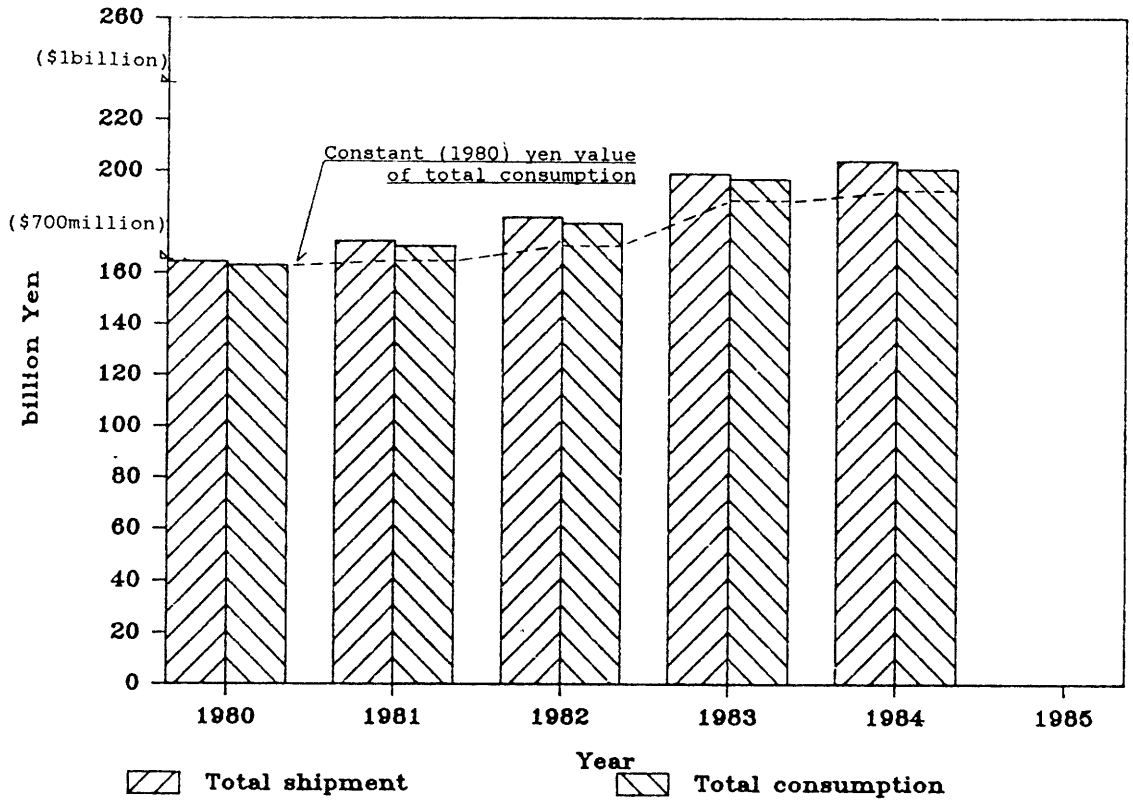
Basic flat glass in Japan : Total shipment and consumption



Source : [36, 37]

Figure 5-16

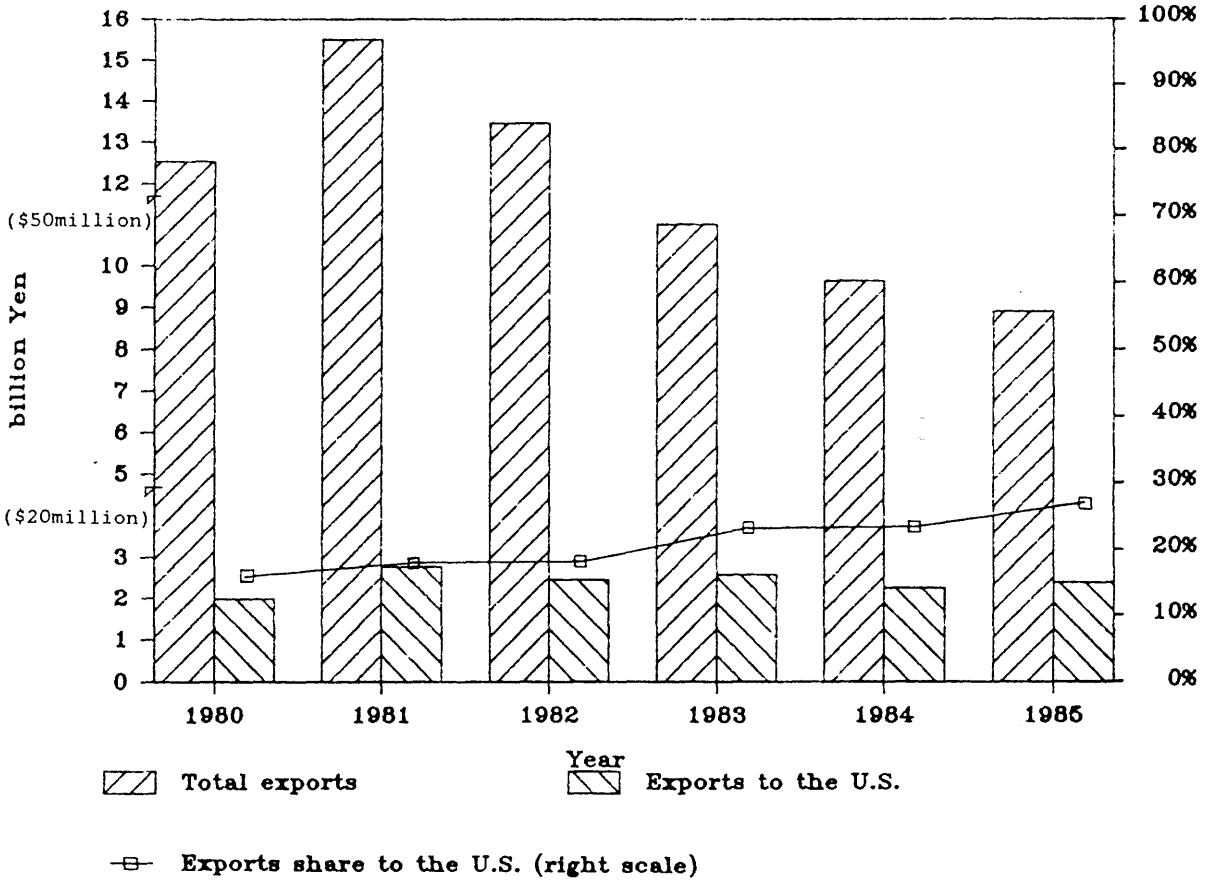
Processed flat glass in Japan :
Total shipment and consumption



Source : [36, 37]

Figure 5-17

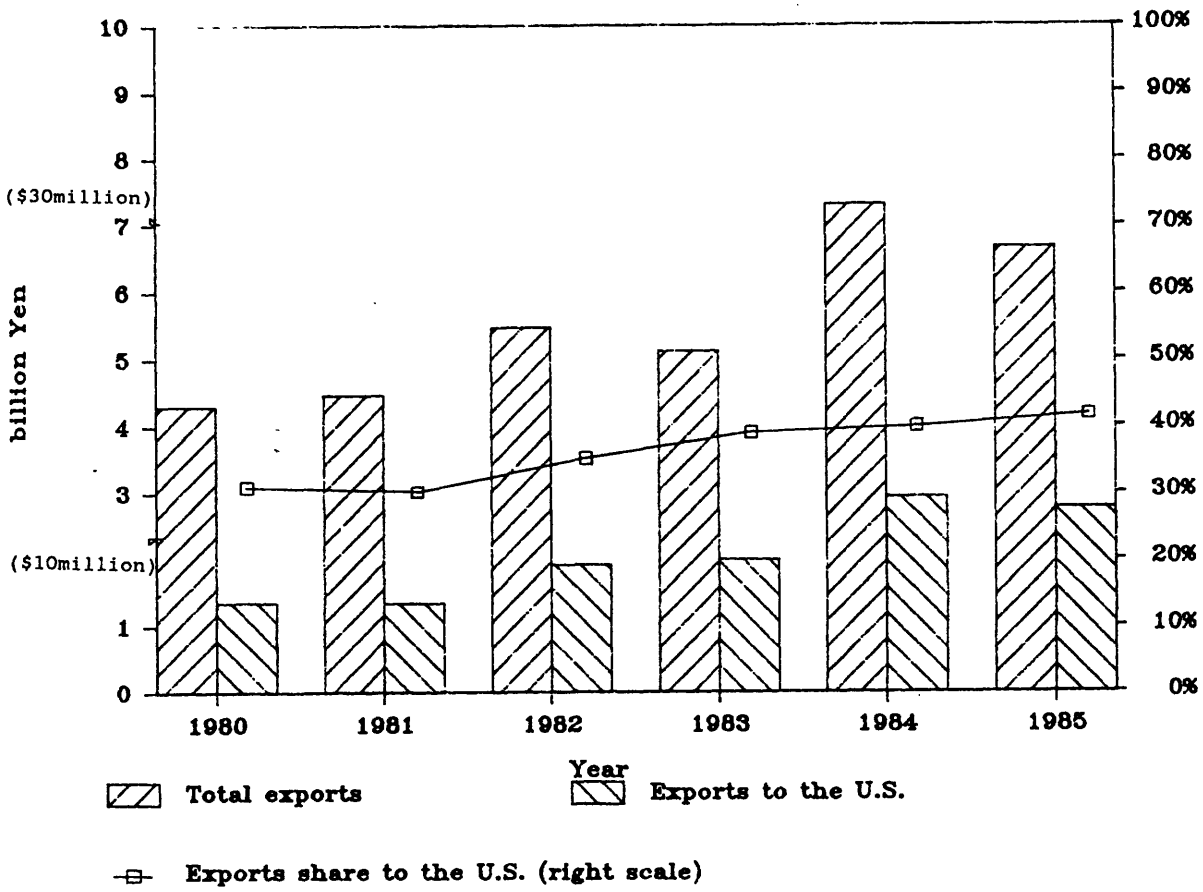
Basic flat glass in Japan :
Total exports and exports to the U.S.



Source : [37]

Figure 5-18

Processed flat glass in japan :
Total exports and exports to the U.S.



Source : [37]

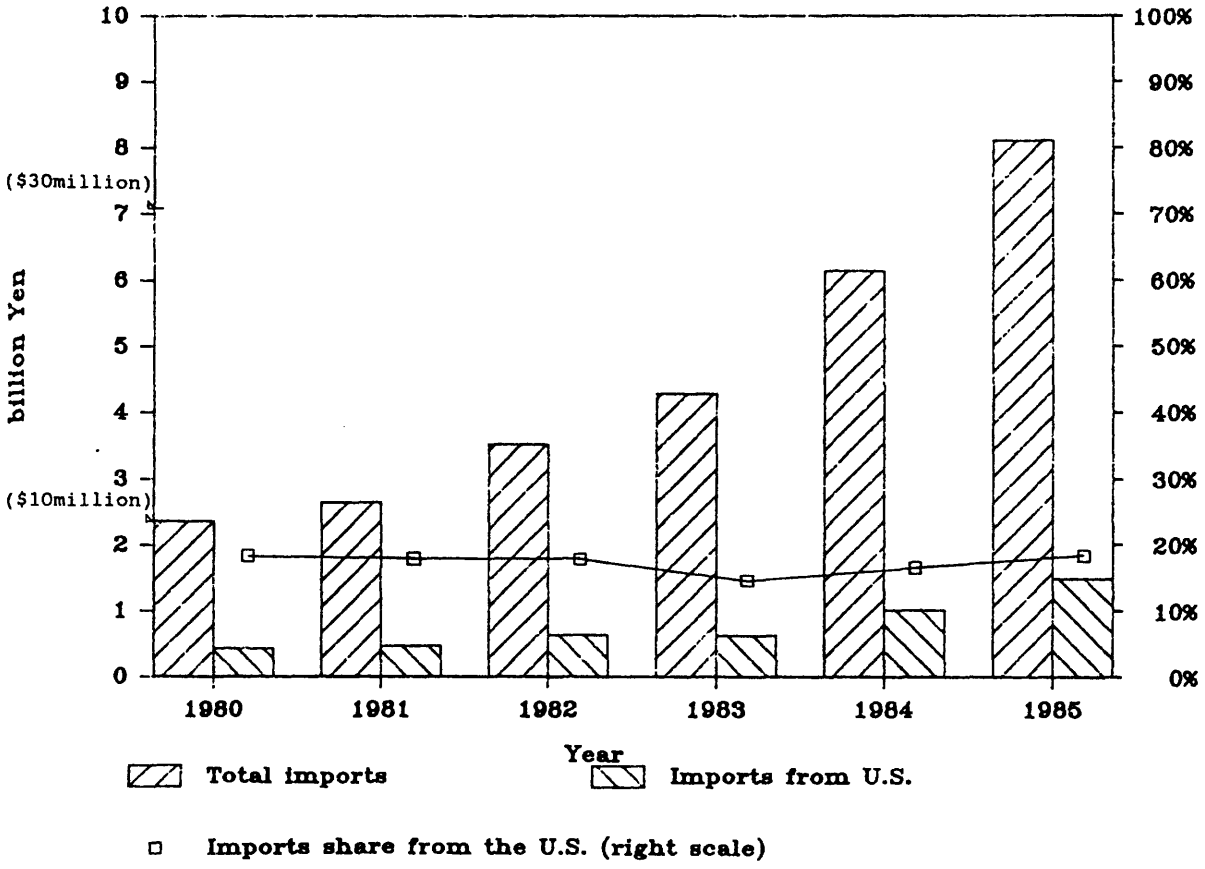
c) Total imports and imports from the U.S.

Figure 5-19 shows total basic flat glass imports and basic flat glass imports from the United States. The total basic flat glass imports have reached almost the same value as the Japanese total exports of basic flat glass, which is the only material investigated in this thesis, that showed such a phenomenon. Figure 5-20 shows the total processed flat glass imports and processed flat glass imports from the

United States. The fluctuating pattern of exports and imports indicates that Japan will no longer be a net exporter of basic flat glass. Instead Japanese manufacturers are concentrating their production on the high value-added products. As discussed in section 4-6 (Chapter 4), the Japanese flat glass manufacturing industry may become a secondary manufacturing industry which imports primary flat glass and processes it into further value-added flat glass.

Figure 5-19

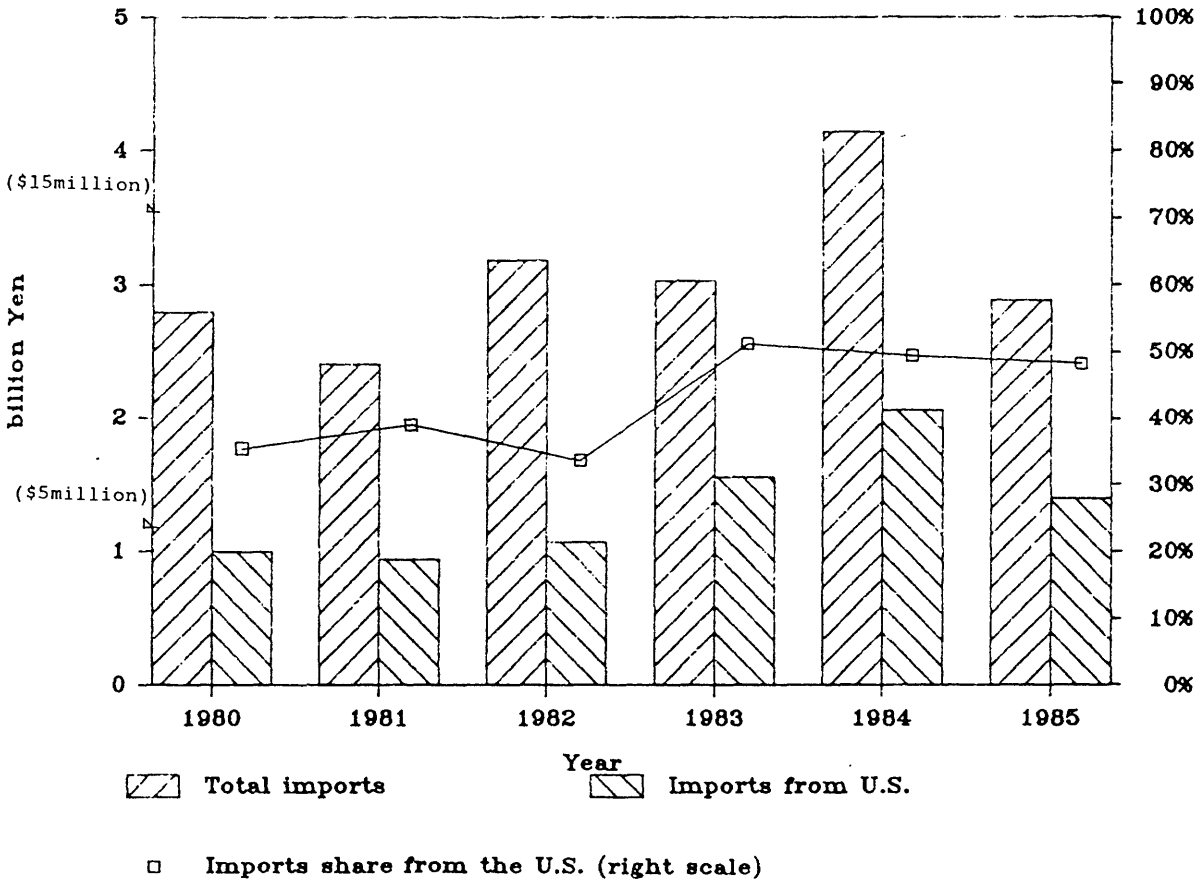
Basic flat glass in Japan :
Total imports and imports from the U.S.



Source : [37]

Figure 5-20

Processed flat glass in Japan :
Total imports and imports from the U.S.



Source : [37]

5-7 Recommendation to Japan's manufacturers of construction materials

As indicated in Chapter 2, the Japanese market in construction materials has been virtually closed through some non-tariff barriers to foreign manufacturers when compared to the U.S. market. However, the increased pressure from foreign countries to open Japan's market will change the structure of the Japanese construction materials market. Chapter 5 suggests that the Japanese construction materials market is exhibiting trends similar to that of the U.S., especially in response to the appreciation of yen. It is very important to learn from the problems that the U.S. construction materials industries are facing. If Japan cannot prevent a flood of imports into its construction materials market in the future, it will be essential for its domestic industries to prepare to accommodate them. Only with such preparation can Japan's domestic manufacturers survive in the future.

The way how Japan's construction material manufacturers can accommodate the flood of imports will be discussed in the next chapter.

Chapter 6 Conclusion

The largest segment of construction investment which is tradeable between the U.S. and Japan is construction materials. As shown in Chapter 3, that investment amounts to one-third of the total construction investment. About 120 billion dollars in the U.S. and about 16 trillion yen ($67.4 billion) in Japan went to construction materials in 1984. These are the most promising markets for foreign construction material manufacturers.

Investigation of the construction materials market reveals that 80 percent of U.S. quantitative consumption of hard plywood is supplied by imports. Chapters 4 and 5 show that the structure of the construction materials market in the U.S., as well as in Japan, may change rapidly in the near future. Therefore, it is very important to understand the present situation of construction materials market and to address problems that manufacturers in both countries now or will soon face.

From both the international trade and the construction industry viewpoints, it is true that low-priced material supplies are beneficial as long as they do not hurt the domestic manufacturing industries. ENR reported that in the 1984, contractors in the U.S. enjoyed a low stable price for construction materials. Unfortunately, the U.S. manufacturing industry (including not only the construction materials industry but also other manufacturing industries) has suffered from low-priced products from other countries in

domestic and international markets. When imports hurt the domestic manufacturing industry, the consequences affect the construction industry too. Therefore, a construction materials market in each national industry must be integrated to reconcile world production and a domestic supply system.

As discussed in section 4-8 (Chapter 4), from the viewpoint of Japanese exporters, there are three distinct market structures for construction materials in the U.S.: (1) the negative market, (2) the positive market, and (3) the neutral market. These three categories suggest not only the structure of the U.S. market for the Japanese exporters, but also possible strategies to help U.S. manufacturers survive. For example, the U.S. cement and tile industries, in the positive and neutral market, seem to be surviving in the U.S. market because they have transformed, or are transforming their structures in order to be integrated with imports. The environment of the U.S. construction material market, which allows the manufacturers to import foreign products in order to compete with these imports and other domestic manufacturers, will make new industry structures in the cement and tile industries work smoothly.

The glass and construction machinery industries, which are suffering domestically from the imports flood, are also transforming the structures of their industries into global industries. The problem they are actually facing is not domestic competition with imports, but rather world-wide over-production and economic recession. The glass and

construction machinery industries are very competitive against industries in other countries. The expected flood of imports in these industries should be understood to be the result of their globalization.

In contrast to these above-mentioned industries, the steel mill industry, in the negative market, is facing the toughest problem. It suffers domestically from high labor cost and internationally from the low-priced products of other countries. The only possible way for the U.S. steel mill industry to survive is to invent new technologies or products that other countries cannot imitate easily. In this way they can dominate the world market for their products. For example, they may be able to produce a special product identity such as a soft drink sold all over the world. They may have patents with which they can sell their products without any competition. Examples may be found even in common products such as concrete reinforcing bars. In Japan, contractors who are making LNG (Liquid Natural Gas) underground tanks must use one manufacturer's concrete reinforcing bars because only that company has the patent on special connections between bars.

It is clear that the Japanese construction materials industry will experience the same fierce competition with NICs (New Industrialized Countries) that U.S. industry has faced, both domestically and internationally, especially after the recent appreciation of the yen. The pattern of Japan's domestic shipments and trade in every construction

material investigated in this thesis except for lumber shows that Japan is increasing its imports of construction materials. The strategy employed by the U.S. construction material manufacturers to survive in the U.S. market offers some lessons for Japanese manufacturers.

There are three possible ways for construction materials manufacturers to survive: (1) by becoming a global industry, like the U.S. glass and construction machinery industries, which develop new technologies domestically and manufacture products in other countries; (2) by integrating imports into the domestic market and using their advantages within that market to control these imports, as the U.S. tile and cement industries do; or (3) by producing special products that other countries cannot produce, by using patents or by making special product identities.

APPENDIX - A

List of tables

Table A-1 Cement consumption in the U.S.

(SIC No. 3241)
Value : million dollars

	Manufac-turers' shipment	Exports of domestic merchandise	Imports for for consumption	Apparent consumption
1979	3981	29.5	305	4256.5
1980	3881	31.4	197	4046.6
1981	3697	71.7	156	3781.3
1982	3474	43.5	111	3541.5
1983	3599	29.4	162	3731.6
1984	4023	23.9	294	4293.1
1985	3984	31.5	432	4384.5

Source : [22]

Table A-2 Cement imports by TSUSA

(c.i.f. basis)
Value: million dollars

	Total imports	Imports from Japan	% of Japan
1980	228.0	25.7	11.3%
1981	179.3	26.0	14.5%
1982	125.0	4.5	3.6%
1983	181.8	0.0	0.0%
1984	343.9	7.6	2.2%
1985	516.7	37.1	7.2%

Source : [24]

Note. TSUSA import No. 5111100, 5111420, 5111440

Table A-3 Steel (structural shapes (heavy), sheet piling, and bearing piles) consumption in the U.S.

(SIC No. 3312415)
Quantity : short tons
Value : million dollars

	Manufacturers' shipment		Exports of domestic merchandise		
	quantity	value	quantity	value at port	*E.P. value
1979	4,686,633	1,751.240	133,082	66.951	61.354
1980	4,317,586	1,761.722	122,506	64.988	59.555
1981	4,252,302	1,823.476	115,089	70.669	64.761
1982	2,902,746	1,224.672	51,973	31.086	28.487
1983	2,720,923	970.837	38,970	22.657	20.763
1984	2,779,206	996.404	27,206	16.819	15.307
1985	3,061,366	1,018.119	23,867	14.641	13.325

	Imports for consumption		Apparent consumption	
	quantity	value	quantity	value
1979	1,952,957	680.621	6,506,508	2,370.507
1980	1,813,179	679.882	6,008,259	2,382.049
1981	2,057,901	836.762	6,195,114	2,595.477
1982	1,576,407	569.475	4,427,180	1,765.660
1983	1,544,189	493.657	4,226,142	1,443.731
1984	2,135,719	683.426	4,887,719	1,664.523
1985	2,101,437	686.879	5,138,936	1,691.673

Source : [28]

* E.P. value : Estimated producers value at plant

Table A-4 Steel (structural shapes (heavy), sheet piling, and bearing piles) imports by TSUSA

(c.i.f. basis)
Value : million dollars

	Total imports	From Japan value	% of Japan
1980	676.259	237.327	35.1%
1981	836.758	254.539	30.4%
1982	625.908	177.295	28.3%
1983	489.721	151.297	30.9%
1984	677.910	227.666	33.6%
1985	681.453	213.838	31.4%

Source : [24]

Note. TSUSA import No. 6098005, 6098015, 6098035
6098041, 6098045, 6099600

Table A-5 Concrete reinforcing bars consumption in the U.S.

(SIC No. 3312426)
Quantity : short tons
Value : million dollars

	Manufacturers' shipment		Exports of domestic merchandise		
	quantity	value	quantity	value at port	* E.P. value
1979	4,444,885	1,289.513	86,281	28.180	25.824
1980	4,237,074	1,308.901	166,168	52.030	47.680
1981	4,417,792	1,371.720	137,317	41.927	38.421
1982	3,792,923	1,081.144	114,740	29.705	27.222
1983	3,999,278	1,070.859	34,528	9.340	8.559
1984	4,212,070	1,140.003	9,889	4.677	4.257
1985	4,326,169	1,182.307	7,409	3.552	3.233

	Imports for consumption		Apparent consumption	
	quantity	value	quantity	value
1979	116,890	39.171	4,475,494	1,302.860
1980	78,612	28.443	4,149,518	1,289.664
1981	51,633	59.876	4,332,108	1,393.175
1982	51,604	13.487	3,729,787	1,067.409
1983	205,620	46.199	4,170,370	1,108.499
1984	431,864	104.148	4,634,045	1,239.894
1985	408,663	103.676	4,727,423	1,282.750

Source : [28]

* E.P. value : Estimated producers' value at plants

Table A-6 Concrete reinforcing bars imports by TSUSA

(c.i.f. basis)
Value : million dollars

	Total imports	Imports from Japan	% of Japan
1980	26.660	8.341	31.3%
1981	17.403	2.750	15.8%
1982	15.076	1.238	8.2%
1983	43.645	1.299	3.0%
1984	98.744	2.735	2.8%
1985	98.671	1.741	1.8%

Source : [28]

Note. TSUSA import No. 6067900

Table A-7 Lumber consumption in the U.S.

Value : million dollars

	Manufac-turers' shipment	Exports of domestic merchandise	Imports for consumption	Apparent consumption
1979	13,361	1,189	2,912	15,084
1980	12,271	1,409	2,152	13,014
1981	11,730	1,197	2,063	12,596
1982	9,889	1,027	1,770	10,632
1983	12,412	1,066	2,743	14,089
1984	12,639	983	2,866	14,522
1985	12,390	1,045	2,725	14,070

Source : [22]

Table A-8 Soft plywood consumption in the U.S.

(SIC No. 24365, 24366, 24367)
Value : million dollars
Quantity : million square feet

	Manufacturers' shipment		Exports of domestic merchandise		
	quantity	value	quantity	value at port	* E.P. value
1980	15,756.476	2,727.361	373.378		95.500
1981	15,647.930	2,552.388	686.440		167.332
1982	15,180.867	2,279.535	451.714		107.249
1983	18,267.374	3,001.046	573.663		135.723
1984	18,828.262	3,064.650	370.602		86.526
1985	19,236.135	3,133.561	320.520		75.219

	Imports for consumption		Apparent consumption	
	quantity	value	quantity	value
1980	31.947	7.572	15,415.045	2,639.433
1981	21.155	5.165	14,982.645	2,390.221
1982	12.127	4.393	14,741.280	2,176.679
1983	43.660	11.672	17,737.371	2,876.995
1984	67.890	17.003	18,525.550	2,995.127
1985	79.063	21.410	18,994.678	3,079.752

Source : [22]

* E.P. value : Estimated producers' value at plants

Table A-9 Soft plywood imports by TSUSA

(c.i.f. basis)
Value : million dollars

	Total imports	Imports from Japan	% of Japan
1980	9.362	0	0
1981	7.312	0	0
1982	5.134	0	0
1983	10.886	0	0
1984	16.041	0	0
1985	21.411	0	0

Source : [24]

Note. TSUSA import No. 2401200, 2401600, 2402100
2402540

Table A-10 Hard plywood consumption in the U.S.

(SIC No. 24351)
Value : million dollars
Quantity : million square feet

	Manufacturers' shipment		Exports of domestic merchandise		
	quantity	value	quantity	value at port	* E.P. value
1979	1,323.841	603.719	33.465	8.461	
1980	1,189.963	563.656	46.126	12.663	10.390
1981	1,070.023	575.562	55.005	10.959	9.142
1982	1,032.916	544.421	41.260	9.468	7.898
1983	1,127.522	628.787	41.135	7.485	6.244
1984	1,085.458	728.362	36.658	7.954	6.634
1985	955.843	643.513	44.023	10.461	

	Imports for consumption		Apparent consumption	
	quantity	value	quantity	value
1979	3,990.364	647.029	5,280.740	1,242.287
1980	2,272.625	425.782	3,416.462	979.048
1981	2,822.450	519.999	3,837.468	1,086.419
1982	2,181.561	384.886	3,173.217	921.409
1983	3,237.280	509.316	4,323.667	1,131.859
1984	2,808.866	478.550	3,857.666	1,200.278
1985	3,412.376	515.414	4,324.196	1,148.466

Source : [28]

* E.P. value : Estimated producers' value at plants

Table A-11 Hard plywood imports by TSUSA

(c.i.f. basis)
Value : million dollars

	Total imports	Imports from Japan	% of Japan
1980	425.780	58.144	13.7%
1981	491.571	52.406	10.7%
1982	353.044	37.186	10.5%
1983	482.106	45.395	9.4%
1984	461.975	44.521	9.6%
1985	492.696	38.686	7.9%

Source : [24]

Note. TSUSA import No. : 2401000, 2401420, 2401440, 2401460, 2401720, 2401740, 2401760, 2401900, 2402320, 2402340, 2402360, 2402500

Table A-12 Brick consumption in the U.S.

(SIC No. 3251111)
Quantity : million standard bricks
Value : million dollars

	Manufacturers' shipment		Exports of domestic merchandise		
	quantity	value	quantity	value at port	* E.P. value
1980	6,090.094	642.019	22.846	3.623	3.301
1981	5,059.247	576.993	46.295	5.314	4.842
1982	5,118.929	560.017	19.541	2.213	2.016
1983	6,218.355	777.242	26.947	3.265	2.976
1984	6,990.599	911.632	23.371	3.271	2.98
1985	6,833.672	936.099	30.955	4.148	3.554

	Imports for consumption		Apparent consumption	
	quantity	value	quantity	value
1980	193.870	14.965	6,261.118	653.683
1981	169.409	14.168	5,182.361	586.319
1982	148.991	12.565	5,248.379	570.566
1983	182.761	13.695	6,374.169	787.961
1984	171.950	14.112	7,139.178	922.764
1985	73.764	8.123	6,876.481	940.668

Source : [28]

* E.P. value : Estimated producers' value at plants

Table A-13 Ceramic floor and wall tile consumption in the U.S.

(SIC No. 3253000)
Quantity : million square feet
Value : million dollars

	Manufacturers' shipment		Exports of domestic merchandise		
	quantity	value	quantity	value at port	* E.P. value
1980	297.635	309.158	7.942	7.319	6.668
1981	299.776	356.887	11.150	13.339	12.153
1982	304.696	366.806	11.763	14.995	13.663
1983	348.305	405.458	10.256	13.680	12.462
1984	408.977	498.672	8.337	11.865	10.810
1985	393.494	473.383	6.125	7.549	6.468

	Imports for consumption		Apparent consumption	
	quantity	value	quantity	value
1980	255.411	243.299	545.104	545.789
1981	254.659	219.776	543.285	564.510
1982	227.903	203.727	520.836	556.870
1983	297.667	247.464	635.716	640.460
1984	452.828	356.465	853.468	844.327
1985	532.682	385.052	920.051	851.967

Source : [28]

* E.P. value : Estimated producers' value at plants

Table A-14 Clay floor and wall tile imports by TSUSA

(c.i.f. basis)
Value : million dollars

	Total Imports	Imports from Japan	% of Japan
1980	195.815	47.857	24.4%
1981	202.278	51.134	25.3%
1982	172.612	38.077	22.1%
1983	209.389	45.277	21.6%
1984	305.480	64.192	21.0%
1985	332.434	75.951	22.8%

Source : [24]

Note. TSUSA import No. 5322020, 5322040, 5322200
5322400, 5322700

Table A-15 Basic flat glass consumption in the U.S.

(SIC No. 32115)
Value : million dollars

	Manufacturers' shipment		Exports of domestic merchandise		
	quantity	value	quantity	value at port	* E.P. value
1979	*	858.130	*	127.060	113.464
1980	*	868.459	*	167.748	147.804
1981	*	952.283	*	166.173	145.701
1982	*	892.059	*	133.884	117.389
1983	*	954.927	*	127.989	112.220
1984	*	955.088	*	116.330	101.998
1985	*	1,174.380	*	102.600	89.960

	Imports for consumption		Apparent consumption	
	quantity	value	quantity	value
1979	*	70.659	*	815.325
1980	*	50.609	*	771.264
1981	*	48.667	*	855.249
1982	*	47.859	*	822.529
1983	*	59.663	*	902.370
1984	*	63.417	*	916.507
1985	*	69.662	*	1154.082

Source : [28]

Table A-16 Flat glass (basic and processed flat glass) consumption in the U.S.

(SIC No. 3211)
Value : million dollars

	Manufac-turers' shipment	Exports of domestic merchandise	Imports for consumption	Apparent consumption
1979	2,058.000	159.000	101.000	2,000.000
1980	1,931.000	200.000	84.500	1,815.500
1981	2,047.000	201.000	70.800	1,916.800
1982	1,998.000	170.000	99.700	1,927.700
1983	2,306.000	170.000	134.000	2,270.000
1984	2,473.000	177.000	168.000	2,464.000
1985	2,585.000	155.000	214.000	2,644.000

Source : [22]

Table A-17 Basic flat glass (except for wired glass) imports by TSUSA

(c.i.f. basis)
Value : million dollars

	Total imports	Imports from Japan	% of Japan
1980	29.362	0.951	3.2%
1981	26.672	0.715	2.7%
1982	22.848	0.318	1.4%
1983	27.150	0.502	1.8%
1984	26.648	0.273	1.0%
1985	27.237	0.339	1.2%

Source : [24]

Note. TSUSA import No. 5410100, 5411100, 5412100, 5413100, 5421100, 5421300, 5422100, 5422300, 5422500, 5423120, 5423140, 5423170, 5423320, 5423340, 5423370, 5423520, 5423540, 5423570, 5423720, 5423740, 5423770, 5424220, 5424250, 5424420, 5424450, 5424620, 5424650, 5424815, 5424835, 5425700, 5426700, 5427100, 5427300, 5427500, 5427700, 5429200, 5429400, 5429600, 5429800.

Table A-18 High value-added basic flat glass (wired glass) imports by TSUSA

(c.i.f. basis)
Value : million dollars

	Total imports	Imports from Japan	% of Japan
1980	19.774	9.773	49.4%
1981	22.783	14.323	62.9%
1982	23.612	12.081	51.2%
1983	30.627	12.261	40.0%
1984	30.072	11.144	37.1%
1985	40.381	12.577	31.1%

Source : [24]

Note. TSUSA import No. 5431100, 5432100, 5432300, 5432730, 5432770, 5433100, 5436100, 5436300, 5436700, 5436900.

Table A-19 Processed glass (toughened and laminated glass) imports by TSUSA

(c.i.f. basis)
Value : million dollars

	Total imports	Imports from Japan	% of Japan
1980	108.020	21.819	20.2%
1981	104.911	22.209	21.2%
1982	150.398	21.514	14.3%
1983	203.392	31.284	15.4%
1984	281.226	36.042	12.8%
1985	349.579	40.737	11.7%

Source : [24]

Note. TSUSA import No. 5441100, 5441400, 5441600, 5441700, 5441820, 5441840, 5442000, 5443100, 5443200, 5444120, 5444140, 5444200, 5444300, 5446100, 5446400.

Table A-20 Construction machinery consumption in the U.S.

Value : million dollars

	Manufac-turers' shipment	Exports of domestic merchandise	Imports for consumption	Apparent consumption
1979	16,190	4,538	744	12,396
1980	15,994	5,742	736	10,988
1981	16,930	6,316	887	11,501
1982	11,647	3,968	778	8,457
1983	10,312	2,393	641	8,560
1984	12,375	2,668	1,409	11,116
1985	13,000	2,570	1,800	12,230

Source : [28]

Table A-21 Construction machinery imports by TSUSA

(c.i.f. basis)
Value : million dollars

	Total imports	Imports from Japan	% of Japan
1980	1,115.56	213.60	19.1%
1981	1,556.44	232.29	14.9%
1982	1,292.44	213.26	16.5%
1983	1,093.77	254.00	23.2%
1984	1,987.20	620.44	31.2%
1985			

Source : [35]

Note. SIC No. 35311001, 35312000, 35313000, 35317005, 35317075, 35318B00.

Table A-22 Portland cement consumption in Japan. 1/

value : million Yen

	Domestic shipment	Total exports	Exports to U.S.	% of U.S.
1980	882,325	86,809	3,897	4.5%
1981	880,954	93,836	3,900	4.2%
1982	836,734	108,039	562	0.5%
1983	767,298	112,685	1	0.0%
1984	717,827	83,003	2,353	2.8%
1985		59,859	7,283	12.2%

	Total imports	Imports from U.S.	% of U.S.	Domestic consumption
1980	34	0.143	0.4%	795,550
1981	14	0.222	1.6%	787,132
1982	201	0.286	0.1%	728,895
1983	172	1.842	1.1%	654,785
1984	1,732	0.710	0.0%	636,556
1985	4,374	0.263	0.0%	

Source : [36, 37]

1/ Domestic consumption is calculated as follows :
Domestic consumption = Domestic shipment - Total exports
+ Total imports
Because the two data (domestic shipment and trade) are from different sources, the domestic consumption figure is not necessarily accurate.

Domestic shipment : Commodity No. 302111

Exports : No. 2523010

Imports : No. 2523010

Table 23 Structural steel consumption in Japan 1/

value : million yen

	Domestic shipment	Total exports	Exports to U.S.	% of U.S.
1980	829,401	199,478	51,588	25.9%
1981	759,908	201,611	56,136	27.8%
1982	743,721	203,143	31,890	15.7%
1983	649,414	156,324	36,830	23.6%
1984	669,665	151,231	56,170	37.1%
1985		138,284	40,925	29.6%

	Total imports	Imports from U.S.	% of U.S.	Domestic consumption
1980	742	280	37.7%	630,665
1981	648	157	24.2%	558,945
1982	953	194	20.3%	541,531
1983	1,264	49	3.9%	494,354
1984	1,844	71	3.9%	520,278
1985	2,127	79	3.7%	

Source : [36, 37]

1/ Domestic consumption is calculated as follows :
Domestic consumption = Domestic shipment - Total exports
+ Total imports
Because the two data (domestic shipment and trade) are from different sources, the domestic consumption figure is not necessarily accurate.

Domestic shipment : Commodity No. 311116

Exports : No. 7311100, 7311211, 7311212, 7311213,
7311220, 7311311, 7311319, 7311321,
7311329, 7311400, 7311500, 7311600.

Imports : No. 7311111, 7311112, 7311119, 7311121,
7311122, 7311123, 7311124, 7311129,
7311130, 7311140, 7311190, 7311200.

Table A-24 Plywood consumption in Japan 1/

value : million yen

	Domestic shipment	Total exports	Exports to U.S.	% of U.S.
1980	767,142	11,279	6,570	58.3%
1981	566,334	10,452	4,038	38.6%
1982	569,826	8,495	6,083	71.6%
1983	572,546	9,044	6,746	74.6%
1984	535,567	7,697	5,351	69.5%
1985		6,382	4,674	73.2%

	Total imports	Imports from U.S.	% of U.S.	Domestic consumption
1980	6,657	618	9.3%	762,520
1981	2,392	543	22.7%	558,275
1982	2,499	709	28.4%	563,831
1983	2,867	570	19.9%	566,369
1984	6,345	592	9.3%	534,215
1985	13,680	650	4.8%	

Source : [36, 37]

1/ Domestic consumption is calculated as follows :
Domestic consumption = Domestic shipment - Total exports
+ Total imports
Because the two data (domestic shipment and trade) are from different sources, the domestic consumption figure is not necessarily accurate.

Domestic shipment : Commodity No. 222211

Exports : No. 4415111, 4415112, 4415119, 4415120,
4415191, 4415192, 4415193.

Imports : No. 4415111, 4415119, 4415191, 4415192,
4415193, 4415194, 4415195.

Table A-25 Tile consumption in Japan 1/

value : million yen

	Domestic shipment	Total exports	Exports to U.S.	% of U.S.
1980	139,085	30,354	10,301	33.9%
1981	133,321	28,358	10,027	35.4%
1982	134,668	25,125	8,215	32.7%
1983	144,420	27,687	9,833	35.5%
1984	160,308	34,028	14,928	43.9%
1985		29,416	14,221	48.3%

	Total imports	Imports from U.S.	% of U.S.	Domestic consumption
1980	3,520	94	2.7%	112,251
1981	2,631	86	3.3%	107,595
1982	3,472	99	2.9%	113,015
1983	3,219	191	5.9%	119,952
1984	4,160	221	5.3%	130,440
1985	3,264	286	8.7%	

Source : [36, 37]

1/ Domestic consumption is calculated as follows :
Domestic consumption = Domestic shipment - Total exports
+ Total imports
Because the two data (domestic shipment and trade) are from different sources, the domestic consumption figure is not necessarily accurate.

Domestic shipment : Commodity No. 304611, 304612, 304619.

Exports : No. 6907010, 6907090, 6908010, 6908020, 6908090.

Imports : No. 6907000, 6908010, 6908090.

Table A-26 Basic flat glass consumption in Japan 1/

value : million yen

	Domestic shipment	Total exports	Exports to U.S.	% of U.S.
1980	229,239	12,542	1,991	15.9%
1981	232,521	15,493	2,770	17.9%
1982	255,257	13,457	2,458	18.3%
1983	255,932	10,994	2,576	23.4%
1984	264,316	9,630	2,253	23.4%
1985		8,894	2,393	26.9%

	Total Imports	Imports from U.S.	% of U.S.	Domestic consumption
1980	2,357	420	17.8%	219,054
1981	2,647	465	17.6%	219,676
1982	3,515	627	17.8%	245,314
1983	4,273	618	14.5%	249,211
1984	6,135	1,011	16.5%	260,821
1985	8,100	1,481	18.3%	

Source : [36, 37]

1/ Domestic consumption is calculated as follows :
Domestic consumption = Domestic shipment - Total exports
+ Total imports
Because the two data (domestic shipment and trade) are from different sources, the domestic consumption figure is not necessarily accurate.

Domestic shipment : Commodity No. 30111, 301112, 301113.

Exports : No. 7004010, 7004090, 7005011, 7005012, 7005013, 7005090, 7006010, 7006091, 7006092.

Imports : No. 7004110, 7004121, 7004129, 7004200, 7005110, 7005120, 7005131, 7005132, 7005210, 7005290, 7006010, 7006091, 7006092, 7006093, 7006094, 7006095, 7006096.

Table A-27 Processed flat glass consumption 1/ in Japan

value : million yen

	Domestic shipment	Total exports	Exports to U.S.	% of U.S.
1980	164,673	4,300	1,353	31.5%
1981	172,684	4,466	1,349	30.2%
1982	181,846	5,479	1,919	35.0%
1983	199,005	5,117	1,994	39.0%
1984	204,077	7,303	2,935	40.2%
1985		6,656	2,768	41.6%

	Total imports	Imports from U.S.	% of U.S.	Domestic consumption
1980	2,796	994	35.6%	163,169
1981	2,403	939	39.1%	170,621
1982	3,179	1,067	33.5%	179,546
1983	3,027	1,553	51.3%	196,916
1984	4,135	2,056	49.7%	200,909
1985	2,882	1,393	48.3%	

Source : [36, 37]

1/ Domestic consumption is calculated as follows :
Domestic consumption = Domestic shipment - Total exports + Total imports
Because the two data (domestic shipment and trade) are from different sources, the domestic consumption figure is not necessarily accurate.

Domestic shipment : Commodity No. 301211, 301212.

Exports : No. 7008010, 7008020.

Imports : No. 7008011, 7008012, 7008019, 7008020.

APPENDIX B

List of Table

Table B-1

Yen - dollar exchange rate

Year	Exchange rate	
1950 / 1970	360.00	yen / dollar
1971	349.83	
1972	303.11	
1973	271.22	
1974	292.08	
1975	296.79	
1976	296.55	
1977	268.51	
1978	210.44	
1979	219.14	
1980	226.74	
1981	220.54	
1982	249.08	
1983	237.51	
1984	237.52	
1985	238.54	

Source : [41]

Table B-2

Producer price indexes in the U.S.

[1967 average = 100]

Commodity group	1979	1980	1981	1982	1983	1984	1985
Concrete ingredients	244.0	274.0	296.3	310.0	313.3	325.7	339.5
Steel mill products	280.4	302.7	337.6	349.5	352.8	366.0	366.9
Lumber	354.3	325.8	325.1	310.8	352.6	349.8	364.4
Plywood	250.5	246.5	245.7	232.1	244.1	241.6	237.3
Structural clay products	217.9	231.5	249.8	260.8	277.8	286.8	295.7
Flat glass	183.9	196.5	212.6	221.5	229.7	224.5	221.3
Construction machinery	256.2	289.4	320.8	343.9	351.9	357.0	362.0

Source : [42]

Table B-3

Wholesale price indexes in Japan 1/

[1980 average = 100]

Commodity group	1980	1981	1982	1983	1984	1985
Ceramics, stone & clay products	100.0	103.6	104.9	104.3	104.6	101.6
Iron & Steel	100.0	101.2	102.3	98.1	98.9	97.5
Lumber & wooden products	100.0	90.1	91.3	88.0	87.4	87.2

1/ Producer price index is not available for this research.

Source : [16]

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